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THE X-RAY EXAMINATION OF THE MASTOID REGION.

BY DR. SIDNEY LANGE.

Radiographer to Cincinnati Hospital.

About a year and a half ago (March, 1908), I undertook some X-ray examinations of the mastoid region. I had repeatedly obtained outlines of the mastoid cells upon lateral views of the skull taken for other purposes and occasionally obtained a hazy shadow of the mastoid process on postero-anterior frontal sinus skiagrams, but I doubted that any practical information concerning the mastoid region could be gathered in this manner.

By way of experiment, the various positions were tried upon cadavers and normal individuals. The postero-anterior position was discarded because the distance of the mastoid process from the plate rendered its details indistinct, and because in this position the X-light traversed the bone in its greatest diameter, and the cells were all superimposed. The lateral view

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FIG. 1.—Patient and tube in position for a mastoid skiagram.

was likewise unsatisfactory, because of the superimposition of the opposite side. The oblique lateral view avoided the opposite side and showed the mastoid fairly well, but the oblique postero-lateral view seemed to give the clearest and most extensive profile view of the mastoid. The pyramid is thus thrown forward and the mastoid details, especially the groove for the lateral sinus, is shown better than in any other position.

The double inclination of the axis of the rays (in the oblique postero-lateral position) coming as they do from above and behind has raised the question of excessive distortion of the relations of the mastoid region. It was especially feared that the distance of the sigmoid groove from the external auditory meatus would be inexact. To decide this question the mastoid process in a dried skull was sawn through vertically and the groove for the lateral sinus, external auditory meatus and tip were marked with small pieces of lead. Skiagraphs were then made in the oblique lateral and in the oblique postero-lateral positions. A comparison of the actual distances on the dried skull with the measurements made from the skiagrams showed that the skiagram enlarged the region slightly, but the actual distance from the external auditory meatus to the groove for the lateral sinus was never more than two millimetres less than that shown on either skiagram.

For the oblique postero-lateral view the patient lies on his side, with the mastoid to be radiographed resting against the plate, and the rays are directed from above (cephalad) and behind, entering obliquely just below the parietal eminence of the upper side, and pointing toward the mastoid process of the opposite side. The most favorable angle was measured. The axis of the compression cylinder is tilted upward (cephalad) at the angle of 25° from the plane of the base of the skull (Reid's base line), and inclined backward 20° from a plane passing vertically (assuming the patient to be erect) through both external auditory meati. This double inclination is well shown on a dried skull which will be exhibited.

As a foundation for the interpretation of the shadows thus obtained, several dried specimens were prepared by outlining

the various parts of the temporal bone with wire, and then skiagraphing. The external auditory meatus, antrum, groove for the lateral sinus, tegmen tympani and tip of mastoid, all important surgical landmarks, were thus identified. In order to aid in the interpretation of the skiagrams made from the living, a small circle of wire is placed in the external auditory meatus, and a small piece of wire placed over the mastoid tip. These metal markers may, however, be dispensed with after one becomes familiar with the shadows. The external auditory meatus can usually be located from its position just back of the condyle of the lower jaw, which point is easily recognized on almost all of the plates. Likewise the tip of the mastoid is usually recognizable except in the dense or diploetic type of mastoid, where it may be indistinct. The external ear should be folded forward out of the way, as its cartilages sometimes cast faint shadows on the plate. The ear may be held forward by adhesive plaster, or more simply by drawing the ear forward, and have patient keep it there by resting the head on the plate.

In regard to the technique of the exposure, little need be said to an audience of this character. Owing to an imperfect technique with an exposure of 40 seconds my early plates were rather unsatisfactory from the standpoint of the Roentgen expert, although all of them were of assistance to the clinician. More recently, I have shortened the exposure to 5 or 10 seconds, and I am obtaining more uniform plates.

Since the healthy mastoid is the basis of comparison for the diseased mastoid, both sides must be skiagraphed. If the exposure be under 10 seconds, and a few minutes allowed to elapse between exposures for a partial cooling of the tube, the same tube may be advantageously used for both exposures, to insure equality of definition and penetration. Since the conclusions drawn from the plates are based upon density as well as detail, it is very important to secure uniform plates of both mastoids. Most of my failures have been due to the difficulty of obtaining such uniform plates.

The comparison of the two sides is facilitated by taking both on a 11x14 plate, covering over half of the plate with lead while

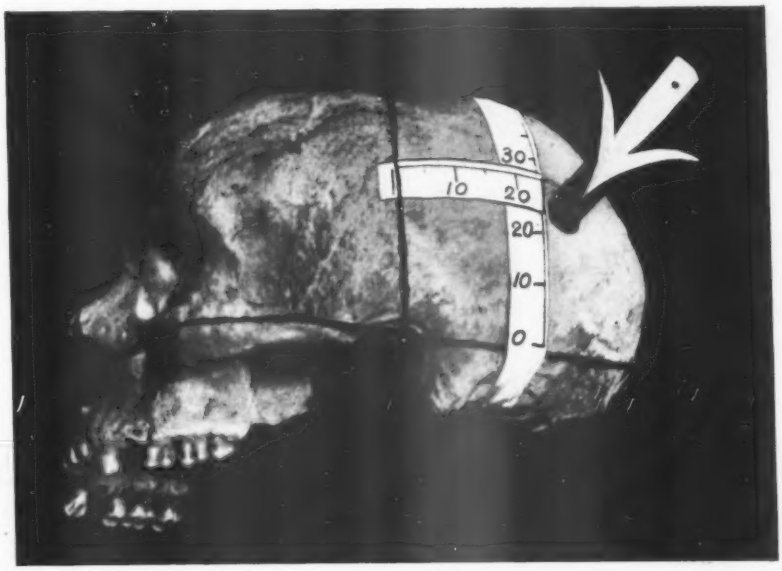

FIG. 2.—Skull showing proper angle for mastoid skiagrams.

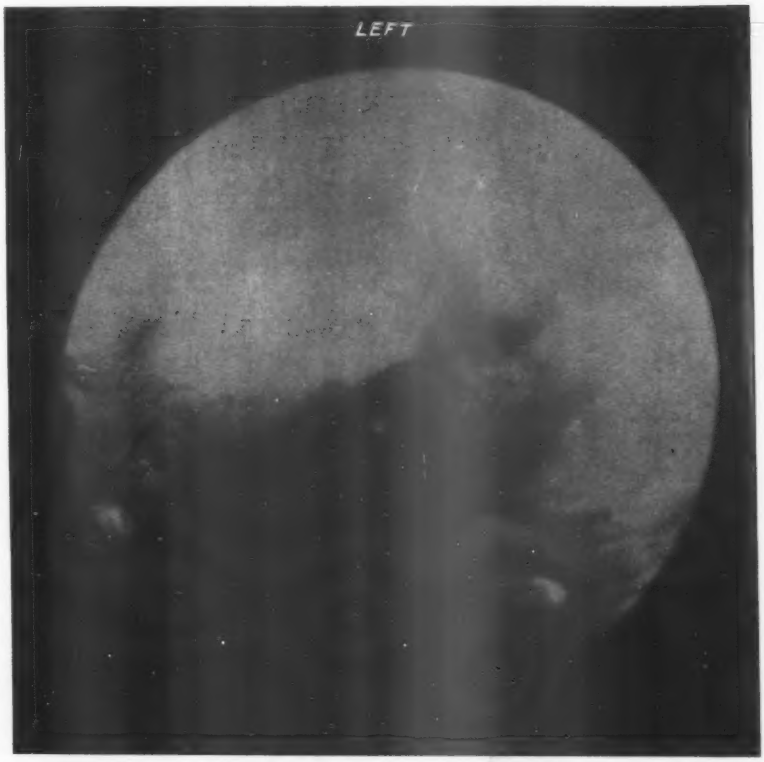

FIG. 3.—A normal adult mastoid.—Sidney Lange, M. D.

exposing the other half. Alopecia is guarded against by using a piece of sole leather, glued to a thin sheet of aluminum. A small compression cylinder, 4 or 4½ inches in diameter, will improve the quality of the plates. The most valuable plates are those which are thin and slightly underexposed rather than those which are dense, for slight changes in density will be sought for more often than gross alterations of bone detail.

The fact that a skiagram of the diseased ear is often valueless without comparison with the other or normal ear brings up the all-important question, whether both mastoids of a given individual are normally identical in density and structure, or approximately so. Since variations are common in all parts of the body, the same may be expected in the mastoid region, yet I have found the closest resemblance of the two sides in most of the normal cases examined. While there may be variations in the size, shape and position of the mastoid cells, there is a close similarity of type, that is, if there is a dense or diploetic mastoid on one side, there will be the same on the other, or if one side is very cellular or pneumatic the other side will be of the same type. Plageman (6) says "Upon a basis of 85 skiagrams of normal skulls we find that as a rule the two mastoid processes of healthy individuals are almost identical."

A review of the literature of the X-ray examination of the mastoid as given by Voss (5) disclosed the fact that the earliest attempt to study the mastoid with the X-ray was in 1898 by Brühl (3), who outlined the mastoid in the dried skull by injecting mercury. Henle and Hinsberg (1) in 1904 first attempted it on the living. The appearance of Schuller's Atlas (2) in 1905 upon the Roentgen study of the base of the skull, gave further impetus to this field. Holzknecht's introduction contained in this Atlas is prophetic in suggesting that the confusion of shadows of the base of the skull will be cleared up, and put to practical use. Voss (5) in 1907, made a series of examinations in the lateral direction. He mentions having obtained all the important anatomical details upon the plate, including the internal auditory meatus. Recent and more extensive observations are by Kuhne and Plageman (7). They

discarded the lateral and oblique lateral positions and adopted the postero-anterior as the most satisfactory, because both mastoids appear upon the same plate, facilitating comparison. They report a series of 15 clinical cases. Jansen (14) recommends both the postero-anterior and the oblique-lateral views. Beck (13) has used the oblique lateral position.

That the oblique postero-lateral position gives the clearest and most extensive view of the mastoid cannot be questioned. The adherents of the postero-anterior view consider that view superior because both mastoids are shown upon the same plate, by the same exposure. The difficulty of obtaining uniform lateral plates of both mastoids has been the chief objection to the lateral positions, but the great advance in technique and apparatus in the last few years should render two such uniform exposures possible.

The Roentgen examination of the mastoid process is valuable from both the anatomic and the clinical aspects.

From the purely anatomic stand-point information concerning the mastoid may be gained, that may prove of great value in operating in this region. In the X-ray examination of the frontal sinuses, the anatomic information afforded is just as valuable as the pathologic. This applies with equal force to the mastoid.

Since the external auditory meatus and the groove for the lateral or sigmoid sinus are readily identified upon the skiagram, the distance between these two landmarks may be measured, not accurately, but approximately, always allowing for slight oblique distortion, and thus the area of the operative field may be determined. This is of no small consequence, as the choice of operative procedures may depend upon whether there is a forward lying sinus or not. Three types of normal mastoid processes are recognized by Politzer (10)—the pneumatic or cellular type, the diploetic or spongy type, and the mixed types. The pneumatic mastoid is extensive, has numerous large and small cells, and the lateral sinus is usually placed some distance back of the external auditory meatus, giving plenty of room for the usual operative procedure. In the diploetic or dense types the mastoid process is small, has

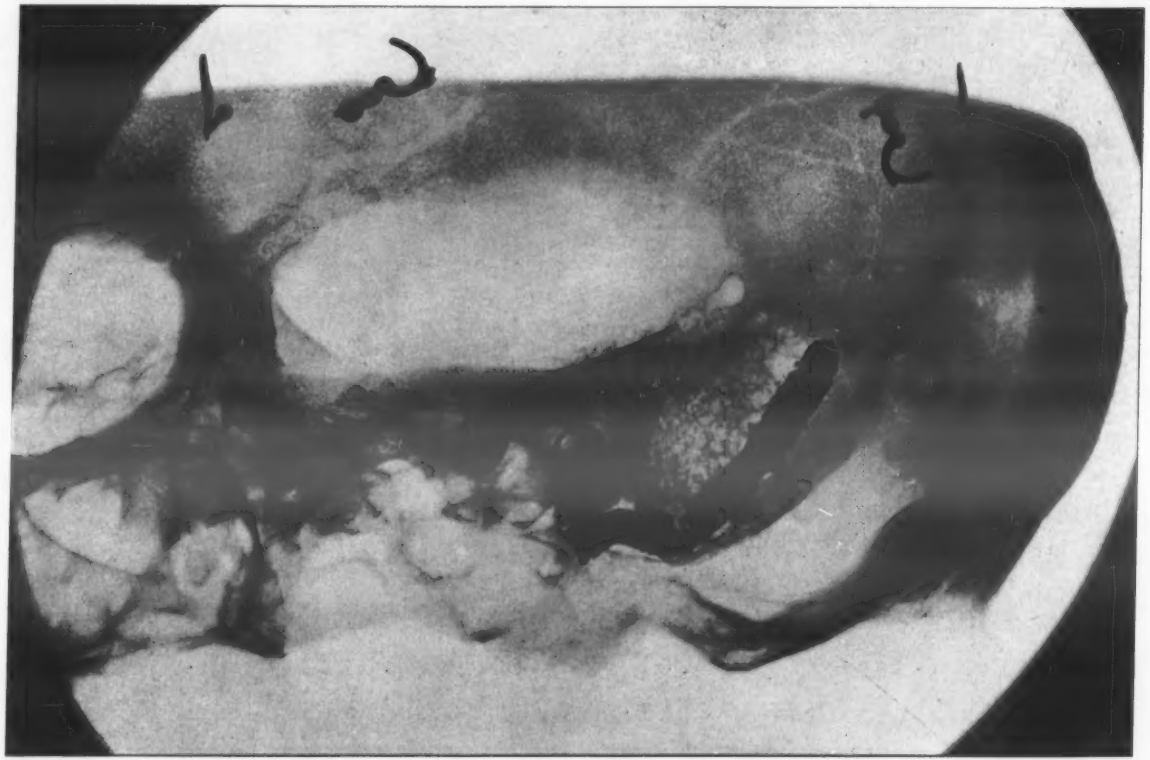

FIG. 4.—Skull showing anatomical landmarks. Ring in external auditory meatus; wire on tegmen tympani; lead foil in groove for lateral sinus and small emissary vein.—Sidney Lange, M. D.

fewer and poorly developed cells, and the lateral sinus lies nearer the external auditory canal. In these cases there is more danger of chiseling into the lateral sinus, and more caution is necessary in operating. Kanasugi (8) examined the mastoid process of 4000 skulls and makes the above statements. In his Atlas, entitled Pars Mastoidea, he calls attention to several mastoid anomalies which should be recognized by Roentgen examination.

The floor of the middle fossa can be located by the skiagam, and if this floor be very low, it would be of considerable importance in operating, to know this in order to guard against penetrating the cranial cavity. Some idea of the thickness of the tegmen tympani may likewise be gained. The presence of cells in the base of the zygoma may be shown. Whiting (9), in his text-book, calls attention to the importance of cleaning out these cells. Cells overlying or underlying the lateral sinus are shown on the skiagram. In addition, some less practical anatomic points may be shown. The facial canal shows up in skiagrams of the dried skull. The jugular bulb is sometimes evident in skiagrams on the living. In one case of a child, I was able to see faintly the semi-circular canals. Dr. Pfahler informed me that he was able in one case to outline the ossicles. Jansen (14), in the oblique lateral position has shown the hammer and semi-circular canals.

Upon the mastoid skiagrams of children under 10 years the mastoid appears entirely spongy or diploetic, there are no visible cells, and the tip is undeveloped. The tip at this time consists simply of an inner and outer table, with little calcellous bone between, and shows no structure upon the skiagram. From 10 to 15 years the mastoid takes on the pneumatic characteristics, large cells appear, and grow downward toward the tip, its diploetic structure finally giving way to the more or less pneumatic adult type.

In interpreting mastoid skiagrams it may not be amiss to inquire if the patient has had mastoid trouble previously in childhood for a previous inflammation and sclerosis may have retarded the development, and altered the appearance of the adult mastoid, thus leading to error.

The clinical aspect of the X-ray examination of the mastoid especially in the milder acute cases is on less certain ground. That gross thickening of bone or gross destruction can be demonstrated upon the skiagram is certain. The chief field for research is to determine whether the **milder** pathological changes, such as inflammation and suppuration of the mastoid mucosa without gross bone destruction will always show upon the skiagram, and whether indications for operation can be deduced therefrom. It remains also to be determined whether small sequestra will show.

The most reliable results are obtained in the **chronic** cases. In almost all the chronic cases examined, the skiagram has given practical and valuable information, showing usually more or less marked sclerosis with haziness or obliteration of the mastoid cells. In one case a defect in the tegmen tympani with haziness and thickening of the mastoid cells was noted. These findings were verified later by operation. The X-ray examination of these chronic cases is often a welcome aid to the otologist, who in treating persistent middle ear disease may be in doubt whether to resort to operative measures or not. Furthermore, cases are on record in which general or localized septic symptoms have originated from a chronic necrotic process in the mastoid, which has developed without marked signs referable to the mastoid. The X-ray may aid in clearing up such cases. Bussey (11) has recently reported 14 cases (13 collected from the literature, and one of his own) of mastoid abscess, in which the signs were anomalous, few or no symptoms referable to the mastoid, and no discharge from the ear. The X-ray may be valuable in this type.

Only a small number of the **milder acute** cases were examined, and no conclusions could be drawn. In several a slight haziness over the mastoid was noted which disappeared again after spontaneous recovery. It is not unlikely that valuable information may be gained regarding the milder acute cases, if plates more technically perfect than those to be exhibited are obtained. Those **severe** acute cases accompanied by extensive bone destruction with abscess formation can, of course, be easily recognized. In two cases, an abscess of the

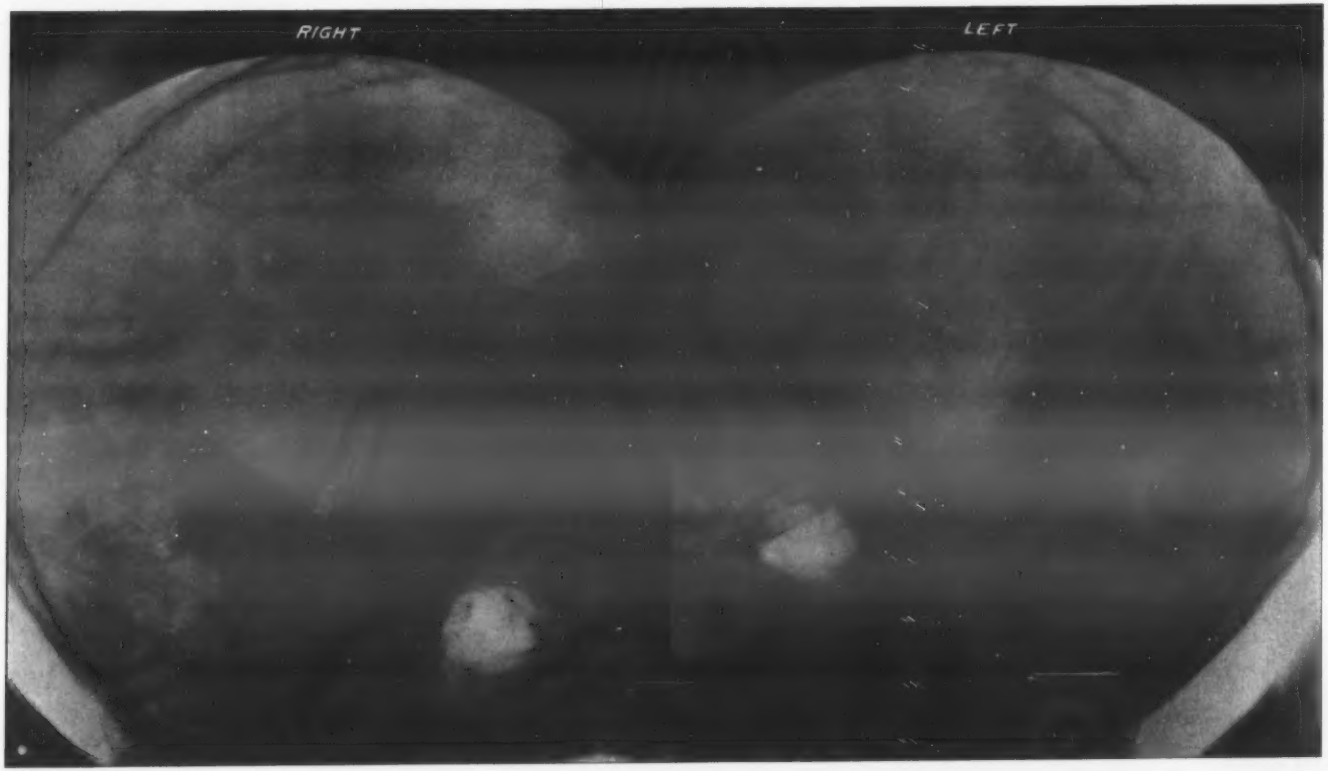

FIG. 5.—The normal mastoid. Extensive destruction of mastoid.
Acute necrosis of mastoid (verified by operation).—Sidney Lange, M. D.

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mastoid was diagnosed from the skiagram and verified by operation. In one of these cases the drum could not be seen owing to swelling of the external auditory canal. Furunculosis was being considered until the X-ray showed the bone destruction in the mastoid.

In conclusion, it may be stated that the interpretation of mastoid skiagrams demands much study, and the enthusiastic co-operation of the otologist. Without the latter, little can be accomplished, for the otologist must correlate the X-ray and the clinical findings, and check up the results by operation. For such aid in interpretation and for the privilege of examining many of the clinical cases, I am indebted to Dr. S. Iglauer (12) at whose suggestion and direction I undertook the work.

Since writing the above it has been found advantageous in certain types of skulls to decrease the angles of inclination of the axis of the rays. If the upward (cephalad) slant from Reid's base line be decreased (from 25) to 20 degrees and the backward slant be decreased (from 20) to 10 degrees a more transverse profile view of the mastoid will be obtained with less oblique distortion.

REFERENCES.

1. Henle & Hinsberg—Zeitschrf. f. Ohrenheilk. Bd. LI S. 59.
2. Schuller—Die Schadelbasis in Rontgenbilde, 1905.
3. Bruhl—Anatom. Anzeiger. XIV, 1898.
4. Winckler—Centralbl. f. Ohrenheilk. Bd. IV, No 11.
5. Voss—Behandlung der Deutschen Otologischer Gesellschaft, May, 1908.
6. Plageman—Verhandlung der Deutsche Rontgengesellschaft, Bd. IV, Sept., 1908.
7. Kuhne & Plageman—Fortschritte auf den Gebiete der Rontgenstrahlen Bd. XII, Heft. 5, Sept., 1908.
8. Kanasugi—Pars Mastoidea—Alfred Holder, 1908.
9. Whiting—The Modern Mastoid Operations.
10. Politzer—Ohrenheilkunde, 1893.
11. Bussey—Iowa State Med. Journ. Jan., 1909.

12. Iglauer—Presented Amer. Laryng. Rhinol. Otolog. Society, Jan., 1909.

Also—Jour. Amer. Med. Assoc., Sept. 25, 1909.

13. Beck—Laryngoscope, Sept., 1909.

14. Jansen—Deutsch Zeitschrift fur Chirurgie, July, 1909. Band 99—Heft 3-6—Seite 526.

DISCUSSION.

DR. E. W. CALDWELL, NEW YORK.

It is rather difficult to discuss a subject of which you know practically nothing. I have never made a radiograph of a mastoid, but after listening to this paper, I shall have no hesitation in attempting to make one. Everyone who has done any radiographic work on the skull will appreciate what beautiful work Dr. Lange has shown us. I do not feel competent to enter into a discussion of the details of the technic, except in one or two particulars. One of these is that it occurs to me that this is a field in which the stereoscope would prove particularly valuable, and I wish Dr. Lange would tell us of any attempts he may have made in making stereoscopic views of this region.

The other point: In locating these planes, the Doctor gave as one landmark, the external auditory meati. Of course, the plane must be located by at least three points, and I should need more careful directions then he has given us to get that plane. My experience in making radiographs of any part of the skull has taught me that it is exceedingly difficult to get landmarks which are really useful.

DR. CHARLES F. BOWEN, COLUMBUS, OHIO.

This work is as new to me as it is to Dr. Caldwell, but I am sufficiently impressed with the importance of this work. I have had some personal experience which has confirmed that impression. It was in a case of mastoid disease following

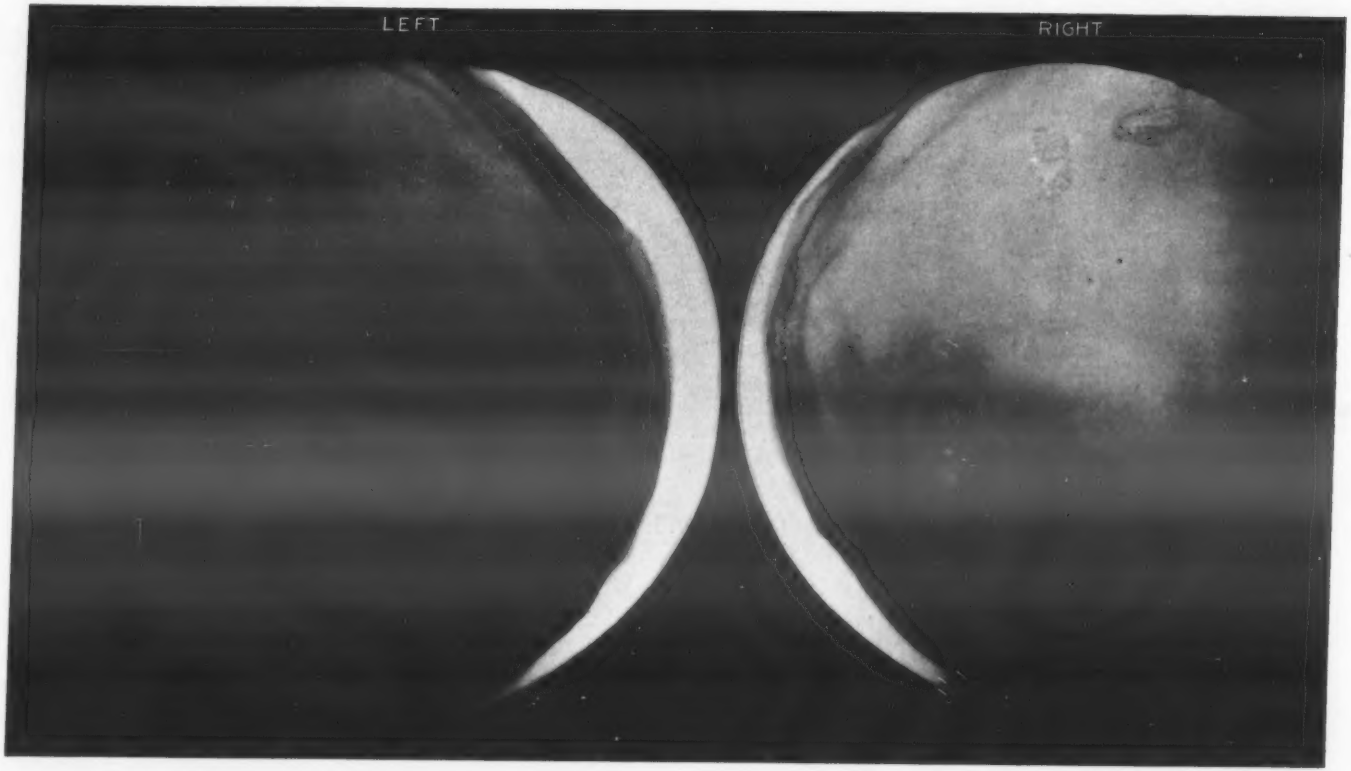

FIG. 6.—Complete sclerosis with obliteration of cells. The normal mastoid.
Sclerosis of mastoid (verified by operation).—Sidney Lange, M. D.

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middle ear trouble of some standing. The surgeon who operated started to perform the usual operation, and after working a few minutes with hammer and chisel, his chisel slid into the lateral sinus, which was in an anomalous position. Had he made a radiograph beforehand, the position of this sinus would have become apparent to him and he would have avoided the accident and would have made unnecessary a second operation.

That, it seems to me, demonstrates the value of the radiograph in this class of work. I wish to thank Dr. Lange for presenting this excellent paper to the Society.

DR. WILLIS F. MANGES, PHILADELPHIA.

I have been considerably interested in mastoid radiography. Dr. Lange's work is highly commendable. I have been using stereoscopic roentgenograms in this study, and I am convinced that it is an advantage over the ordinary skiagram. Variations or anomalies in the lateral sinus are more clearly defined. Of course, it means that you must make two equally good plates, which is sometimes difficult of accomplishment in a part as thick as the skull. I believe that I have succeeded in showing the otologists that we are in a position to help them in their work. I recently had a case in which the mastoid cells were not involved at all, but the radiogram showed an area of necrosis that seemed to be on the floor of the auditory canal. There was considerable bone destruction. It was possible to trace the extent of the process definitely. The relation between the external and the internal auditory meati was very clearly shown. I believe that the stereoscope is most useful in this line of work.

This paper opens up a field of work which is worthy of development. I believe it is even more important than frontal sinus work, and that it will be a great benefit to the profession.

DR. GEORGE E. PFAHLER, PHILADELPHIA.

I think we ought to congratulate Dr. Lange on the beautiful work he has done and for presenting the results of his work

so clearly and concisely. I have not done nearly the amount of work that he has done, but enough to be impressed with its importance. About three years ago Dr. Hickey and I looked over some plates I had made, and I demonstrated them at the meeting of the Section on Stomatology of the College of Physicians. I think my point of localization was almost exactly the same as the one described by Dr. Lange. I have done less of that work since then because there did not seem to be any great demand for it. I did some experimental work on the skull and radiographed a few clinical cases, but for some reason the otologists and rhinologists in Philadelphia are slow to appreciate the value of the Roentgen ray as an aid in their line of work.

DR. GEORGE C. JOHNSTON, PITTSBURG.

Frontal sinus work was popularized some years ago by Dr. Caldwell, and kidney work was given its first impetus by Dr. Leonard. Now Dr. Lange has shown us what can be done in mastoid work. It is a great benefit to the profession. And yet many men do not use the Roentgen ray for locating foreign bodies in the eye. They claim that they can do everything with the Haab magnet, which in reality will attract only certain bodies. The Roentgen ray will show them all. In rhinology the examination of the sinuses is usually made by means of transillumination, but by and by the rhinologist will come to learn and appreciate that transillumination is a very deceptive agent, and after he has seen a few cases in which the right antrum is opaque and the left is clear, and he operates, only to find, much to his surprise, that the right antrum is clean and that the left is full of pus, he will lose his faith in transillumination and place reliance entirely on the Roentgen ray.

Mastoid work is new to us all, and if the members of this Society will give some time to the development of this work, they will find that in another year a considerable amount of this work will be demanded, thereby increasing the respect of the general profession and especially of the rhinologist for the Roentgen ray.

DR. LANGE (closing the discussion).

With regard to the points of localization mentioned by Dr. Caldwell: The vertical plane passes through the external auditory meati; its third point is located by assuming the patient to be in the **erect** posture and passing the plane **vertically** through the two external auditory meati; then it is tilted backward twenty degrees. The other plane passes through Reid's base line and is tilted 25 degrees cephalad. However, each case must be judged by itself. We should study the skull and then make the view in the plane that is best suited for that particular case.

I gathered from Dr. Beck's report that he made use of only one inclination, but I found that it would superimpose the edge of the petrous portion of the temporal bone on the lateral sinus.

Regarding stereoscopic pictures, I believe Dr. Manges is right, but I think I am exceedingly lucky when I get one good picture of each side, although stereoscopic plates would be of great value, if four uniform plates could be obtained.

With regard to the value of this work, I was at first somewhat skeptical on that point, but I am convinced now that there is not one **chronic** case out of ten in which the Roentgen ray will fail to show something of value. In the acute cases, the severe cases, where there is bone destruction, one ought to be able to show this if the skiagraph is perfect, but a simple, suppurative inflammation of the mucosa may not show. I do not know about that. After all, what the aurist wants to know is whether or not an operation is indicated, whether spontaneous recovery is possible or whether extensive bone destruction precludes this. If we make a picture of the mastoid and compare it with a picture of the opposite mastoid, we can say whether they are alike or not, although we cannot say whether they are inflamed or not. But bone destruction is readily distinguishable. If the mastoid cells are indistinct or destroyed we can say in all probability the patient should be operated on.

I want to repeat again that every otologist will frequently find cases in his practice where he is unable to determine

whether or not there is a chronic destructive process in the mastoid. By means of the Roentgen ray he can determine what is going on in those bones and what should be done. Several otologists have told me of cases where the entire mastoid was broken down and yet few symptoms were manifested, possibly only a little vertigo, but no swelling or pain.

With regard to Dr. Pfahler's remarks, I knew that he had been doing this work for some time; in fact, he spoke to me last June about making good plates and using approximately the same angle as I did, but I could not find any reference in the literature to his work.

NOTES FROM SOME OF THE ROENTGEN LABORATORIES OF EUROPE.

BY G. E. PFAHLER, M. D., PHILADELPHIA, PA.

After some correspondence between our President and myself before I left for Europe, we agreed that it might be advantageous to the Society to prepare some notes upon my return. This has proved more difficult than I at first anticipated.

I have only been able to visit some of the best laboratories, which were under the direction of men whom we know and admire because of their advance work. While I have seen comparatively few, I believe they may be considered the representative laboratories of Europe.

Many of the leading men were absent on their vacations, but I was shown every courtesy by the associates or assistants. I may say that every one was most courteous.

In Hamburg I was able to visit the Allgemeinen Krankenhause of St. George, and Prof. Albers-Schonberg's Roentgen Institute through the courtesy of his associate Dr. Foedor Haenish, to whom I am especially indebted. With his work most of you are familiar. I was permitted to see many of his kidney plates, which were the most beautiful I have ever seen. In the majority of cases he is able to demonstrate clearly the outline of the shadow of the kidneys. His technique is fully described in his book published about a year ago and entitled "Roentgendiagnostik des uropoetischen Systems, 1908." I would especially call attention, however, to the use of the "Luffa Schwam" which he recommends, and which consists of the leaf sponge sewed together and covered with muslin, and then placed under the Albers-Schonberg compression diaphragm. This simply gives additional compression and prevents the abdominal tissues from crowding up in the cylinder.

He also demonstrated a number of plates to me showing supernumerary and accessory bones, especially in the foot, which might easily be mistaken for separations by fracture.

These are not new, but have been described in old anatomies, and are referred to in allied literature. One is therefore impressed with the fact that the Roentgenologist of today must be a thorough student, not only of the literature upon Roentgenology, but upon allied subjects, and there are few subjects that do not bear some intimate relationship to our specialty. Unfortunately our literature, in America, is scattered, and because it must be published in the general medical journals, it is necessary to write for the general practitioner. The demand for short papers compels us to omit many details that are of vital interest to the Roentgenologist. While we are often impressed with the verbosity of the German and French writers we are compelled to admire their thoroughness.

For the sake of brevity I will omit many points that might be discussed, and limit myself to the most striking ones.

Dr. Schmidt, of Berlin, showed me an interesting experiment which was first described by Dr. Schwarz, of Vienna. He compressed the middle of the palmar surface of the finger of a healthy hand. The remainder of the finger was covered with the same material and in like thickness. The whole finger was then exposed to the Rays sufficiently to produce blebs, which occurred only on the parts of the skin which were not compressed. The middle part of the finger which was compressed showed no effect. This strikes me as an important point for discussion and further investigation. It seems to indicate that the effects of the rays depend upon the blood content of the tissues. One is struck by the contrast with the Finsen treatment, in which the tissues are compressed in order to obtain the best effects. This experiment seems to have direct bearing upon the very principle of our therapeutic work.

The most wonderful advance made in Roentgenology, I believe, is that by Prof. Rieder and Drs. Kostle and Rosenthal in the production of actual cinematographic Roentgenograms of the internal organs. Cinematographic Roentgenograms have been made before, by the slow process, in which a number of Roentgenograms were made separately and not in rapid succession, so that when reproduced on a cinematographic film and moved rapidly, they produced the effect of motion. We

all remember the beautiful film loaned to this society two years ago by Dr. Alban Kohler which so well demonstrated the effects of the movements of the diaphragm upon the heart and lungs. (I regret deeply that I was not able to accept Dr. Kohler's earnest invitation to visit his laboratory. The society, I am sure, would have been under further obligations for some new advance.)

Prof. Rieder and Dr. Kostle were absent from Munich, and in their absence Dr. Rosenthal demonstrated to me their cinematographic films, showing the effect of the movements of the diaphragm upon the right side of the heart, and the peristaltic movements of the normal stomach. These Roentgenograms were made in rapid succession upon 8 x 10 inch films. The films were changed by means of an automatic mechanism, which I was not permitted to see. (Dr. Rosenthal, not being a physician, has the privilege of secrecy.) I was told that this automatic mechanism worked synchronously with the making and breaking in the primary current through the coil.

The large films were then reduced to a small cinematographic film; and these were demonstrated directly by looking through the moving film by means of a magnifying lens, which showed the peristaltic movements most beautifully. I had hoped to have the films and the apparatus sent to the ship and to have brought them to America to demonstrate to this society at this meeting. There has been some delay due to the absence of Prof. Rieder and Dr. Kostle. However, if they concur, Dr. Rosenthal promised to send them later, and I hope to have the privilege of demonstrating them to at least a part of this society.

The thoracic film consisted of six exposures. The stomach film consisted of twelve, and these twelve were made in rapid succession during the time that the patient held his breath. This means that within twenty or thirty seconds twelve stomach plates were made. This of necessity included the time during which the films were changed, which must reduce the time of each exposure to less than a second. I am told that approximately 100 m. a. passed through the tube. When one

realizes that the same tube must be used for the twelve exposures, it must be acknowledged a truly wonderful result.

This film of the stomach demonstrated two distinct indentations or waves in the lower part of the lesser curvature at the same time and at a certain period of almost equal depth. This can hardly be observed fluoroscopically, and is, I believe, a new observation. The peristaltic waves of the greater curvature correspond to those seen fluoroscopically.

As to the practical applications of this cinematographic work in diseased conditions, I am less enthusiastic. While it would be of value in the accurate record of stomach motility, especially in the study of malignant disease, the great skill required, the costly apparatus, the cost of material and the amount of work required, I fear will make it almost prohibitive. It will find a practical application in the study of physiology, and in special pathological cases records may be made and preserved for teaching purposes. An endowment would make this work possible.

Though my notes are becoming extensive I must refer to the excellent work of Holzknecht in the diagnosis of malignant conditions of the stomach. The vast amount of material at his command has enabled him to develop much skill, and I think he has established beyond a doubt the value of the fluoroscope in the study of the stomach. When I see his dermatitis however, I shudder at the amount of exposure to which he subjects himself.

I was privileged to visit the Allgemeinen Krankenhause and Prof. Albers-Schonberg's Roentgen Institute in Hamburg, through the courtesy of Dr. Foedor Haenish. In Berlin I visited the Rudolph Virchow Krankenhause, in the absence of the director, Dr. Levy Dorn, by the courtesy of his assistant, Dr. Hessmann, of the Charité Hospital; also Drs. Immelman, Schmidt and Max Levy in their private laboratories. In Munich I visited Prof. Rieders and Dr. Grashey's laboratories in the Allgemeinen Krankenhause, and in Vienna Dr. Holzknecht in the Allgemeinen Krankenhause and Prof. Schiff and Dr. I. Robinson in their private laboratories. In Paris Dr.

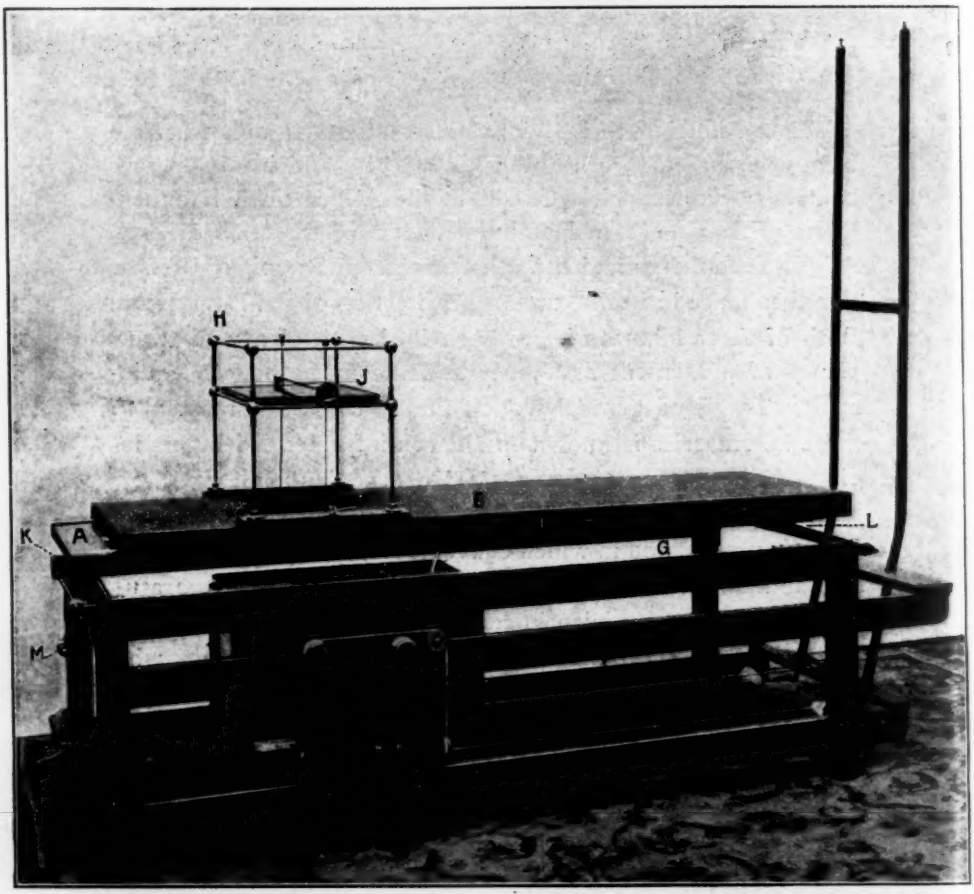
Beclére's laboratories in the St. Antoine Hospital, through the courtesy of Dr. Lebard and Dr. Jangeas. To these gentlemen I am deeply indebted. Time will not permit further discussion of the excellent work which they are doing, but I shall briefly refer to the equipment used in their laboratories.

EQUIPMENT.

Before referring to individual instruments I cannot refrain from referring to two hospital laboratories which might serve as present-day models. One is in the Allgemeinen Krankenhause of St. George in Hamburg, under the direction of Prof. Albers-Schonberg; and the other is that of Rudolph Virchow Krankenhause in Berlin, under the direction of Dr. Levy Dorn. Both of these laboratories are provided with plenty of space, plenty of permanent assistance and the most modern equipment. The good general work done by these two masters in these laboratories is known to all well-informed Roentgenologists. The Roentgen laboratory of the Rudolph Virchow Krankenhause occupies an entire building which was designed for the purpose, and in which convenience, space and protection are the main features. Each laboratory has special apparatus designed by the physician in charge to meet some specific purpose. Most of these are known to the Roentgenologists who are familiar with the current German and French literature. To those I offer an apology. I will only speak of four in this paper and will simply demonstrate the others upon the screen by means of lantern slides.

First.—The Trokoscope or orthodiagraphic examining table of Dr. Foedor Haenish. This table permits both Roentgenoscopic and Roentgenographic examinations in the horizontal position with the tube either below or above the patient. It permits accurate movement of the patient alone having the tube and screen stationary, or permits the movement of the tube and screen in unison. During these examinations the tube is in a protection box. It permits of the adjustment of the plate to irregular parts of the body at unusual angles.

Second.—The Quantimeter of Kienbeck. This consists of strips of photographic paper placed upon the skin of the patient during the exposure, then developed and compared with a

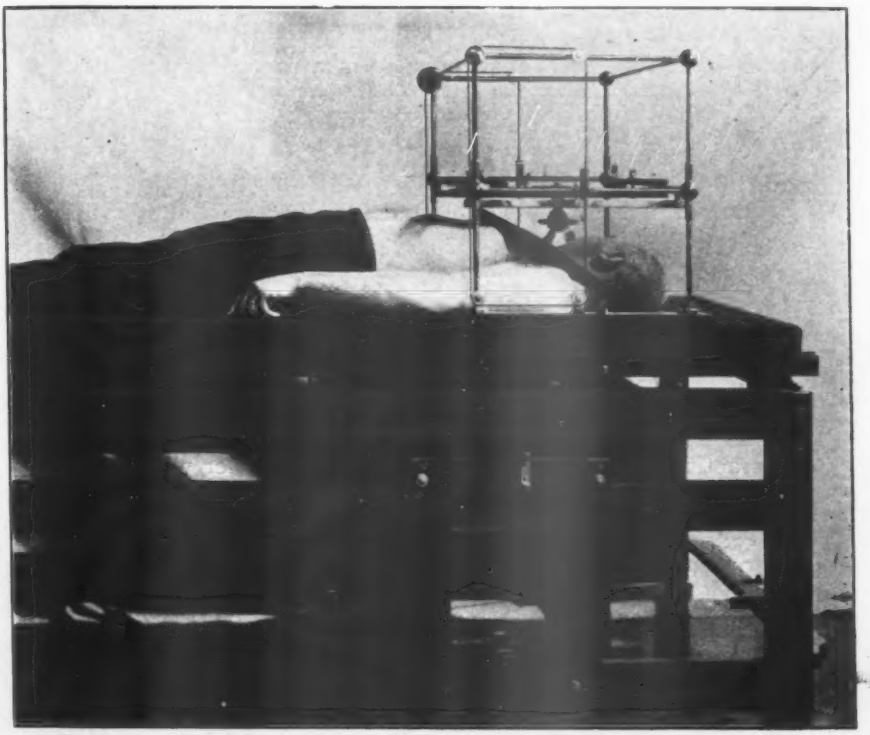


Trokoscope or Orthodiagraphic Examination Table of Dr. Foedor Haenish

standard scale, ten units of which is the dose required to produce a reaction of the skin. While this Quantimeter permits of many technical errors, by careful attention to details it gives probably the most delicate measure of dose yet invented, especially for skin disease. In deep-seated disease, the personal

skill of the operator, based upon previous experience, must be depended upon until some other standard is established.

In connection with this instrument should be mentioned the Quantimeter of Immelmann and Lepper, in which a photo-



Application of the Trokoscope

graphic plate is exposed in a developer and examined during the exposure. Likewise Schwart's Quantimeter which depends upon a precipitate produced in a solution by the action of the rays; and Holzknecht's capsules containing a chemical substance which changes color under the influence of the rays; and then the barium platino cynanide disks of Saborand and Noire, which turn yellow under the action of the rays.

Third.—I would mention as new and unusual the Diaphragm of Lepper, which is constituted like an old fashioned water

wheel. It is revolved around the tube and the spaces between the paddles produce the diaphragm effect. This permits the exposure of a large plate, requiring, however, a corresponding long exposure.

Finally, I wish again to thank the men visited for their courtesy, the result of which I have tried briefly to express, and I trust that this report may form a precedent for future visits of other Roentgenologists.

DISCUSSION.

DR. H. W. VAN ALLEN, SPRINGFIELD, MASSACHUSETTS.

The so-called Schwartz solution is a 4% solution of oxalate of mercury and 5% bi-chloride of silver. I have used it, but have found it to be very unstable and therefore unsatisfactory for practical use. I would like to ask Dr. Pfahler whether he has produced a dermatitis with ten measures of the measure he speaks of. I have known it to be produced across the water, and have wondered whether this was the correct amount.

I think that switch would be a most useful thing, because it would guide us in the length of our exposures.

In regard to the water-wheel arrangement, I saw the plates that Immelmann of Berlin made, and they were excellent. He skiagraphed only the long parts of the body, such as the extremities. I saw Holzknecht using the slat-sided diaphragm in his clinic, and it seemed to be very good. It left a rather irregular and unpleasant outline on the negative, at least the outside of the picture was irregular; a very minor thing, but unusually noticeable.

I was very much pleased with Dr. Haenisch's table. It was clumsy, as all German instruments are, but it was wonderful with what ease he could move his patient and the box beneath him. For taking ribs, the table was very useful. Dr. Haenisch treated us very nicely, showed us the advance sheets of his

book, and seemed to be willing at all times to give up his own time and pleasure to American doctors, and we learned much from him. He also showed us his leaf sponge, and he showed the outlines of the kidney better than I have ever seen them here.

In Berlin, in the Virchow Krankenhaus, the setting of the building was excellent,—sixteen rooms in a two-story building, each room specially equipped and plenty of assistants, so that they can do most excellent work. At Holzknecht's place we enjoyed very much his demonstration of the use of the fluoroscope. It was something to be remembered. His hands were in bad shape, but I think that was entirely due to the careless way in which he puts his hand back of the screen to manipulate the patient, or to manipulate the stomach if stomach action was not present. It does not seem possible, if circumstances were reversed, and the ordinary roentgenologist came from Europe to this country, that the courtesy would be extended to him by us as is shown the Americans by the Europeans.

In England they are using a large number of mercury interrupters with a gas above the mercury. They cut the current down to a very small amount and yet it is very effective. Their fluoroscopic work is wonderful. I have seen kidney stones fluoroscopically as I never saw them anywhere else.

DR. ARTHUR HOLDING, ALBANY, NEW YORK:

The subject might very well be divided into two parts, one taking up the operator's personality, and the other his apparatus and technic. The instruments I saw over there were very cumbersome, and considering this fact and one other, that duty must be paid on them, when they are brought into this country, as a rule it is not worth while bringing them over here. But many good ideas can be obtained there that ought to be introduced into American machines. One thing that struck me particularly was the large amount of fluoroscopic work they are doing. When I landed in Europe I was convinced that I would not do any fluoroscopic work under any

consideration, but I soon saw that it is a necessity. The thing is to make it safe, but we must come to it whether we will or not.

The Haenisch table, Albers-Schonberg "casette" or Bedere "stativ" must be modified by our manufacturers, so that they are more simple and more effective. In connection with fluoroscopy, the mercury interrupter working in a gas atmosphere (London) was another machine that seemed really worth while bringing back to America.

In conclusion there are a few points which I would like to mention. In Germany they are devoted to skiagraphic work but in Vienna almost entirely to fluoroscopic work. One country does not seem to blend with the other. The men differ in technic and everything else. When I saw the machine used by Rieder in Munich, I became convinced of the advantage of having a good electrical engineer interested in our work and living in the same town. One point I would like to ask Dr. Pfahler is whether he saw much of the fulguration work talked of so much in Amsterdam a year ago.

DR. WILLIAM H. DIEFFENBACH, NEW YORK.

Americans or Englishmen who go to Germany or Austria should not think of going there without a fairly good knowledge of German. You will find that many of the professors are unable to speak English, so that an American or Englishman who is not possessed of a fair knowledge of German will be laboring under a great disadvantage.

When I was visiting Holzknecht four years ago, a gentleman from Dublin was constantly asking me what the professor was saying, his appreciation of the demonstration being much impaired by his ignorance of German.

Another point to be remembered is this: Most of these men take their vacations in August, so that visitors from abroad should time their visits accordingly; otherwise they will find only the assistants, who, as a rule, however, are competent men and willing to show the apparatus and how it is used.

In regard to the Kienboeck quantimeter, I think that most of the men in Europe do not take kindly to it. The Sabouraud disks are used the most now, although at one time the Holzknecht apparatus was used very largely. Photographic paper always varies, even in one's possession, and if Dr. Pfahler brought over a quantity of that paper, he will find in a few months from now that the films have changed, making the method of measurement inaccurate and unreliable; that is the strongest criticism that can be made against the photographic paper measurement.

DR. D. R. BOWEN, ROME, N. Y.

My experience with reading German may be of use to some of you. During the past nine months, with practically no previous knowledge of German, and with only a little help from a now-medical teacher, I have been able to read Grashey's Atlas, the Roentgen Kalendar and some other papers. It has been rather slow but most interesting and not nearly so difficult as I had expected.

DR. CHARLES LESTER LEONARD, PHILADELPHIA, PA.

I want to say a word in reference to the advantage accruing to Americans who travel in Europe and see the work that is done by the men over there. It is an advantage not only to them, but also to those who remain at home, because the more the European roentgenologist knows of the American and his work, the better it will be for the reputation of American roentgenology, and the greater the credit which will accrue not only to this Society, but to every individual engaged in this line of work.

The meeting at Amsterdam last year was productive of much good in that it taught the Europeans to look to America for some original work in roentgenology, and I hope that more Americans will take occasion to attend the meeting which will be held next year (Sept. 13th to 18th) in Barcelona, Spain. By doing so, they will bring back to America the credit which is due the American roentgenologist for his original work in

this field. All of you who can should attend this Congress, and make yourselves felt as a force in Roentgen work the world over, as you are known to be in this country.

DR. PFAHLER (closing the discussion).

I have not yet produced a dermatitis, because the time that has elapsed since I began to use the scale is too short. Dr. Haenisch regards this test very highly, in fact he thinks it is the best, and it was on his recommendation that I got it. While there are errors there, and Kienboeck has called attention to all these errors, I can add nothing by way of suggestion in that line, and I believe that it is the most accurate method we have. It seems to be a complicated one, and it is time-consuming. That is one reason why the Sabouraud and Noire disks are so popular. We gave twice the dose with these disks, and I could not tell the difference, nor could anyone else. I do not believe that they are accurate, and the disks I had were not more than two weeks old.

THE ROENTGEN DIAGNOSIS IN PULMONARY TUBERCULOSIS.

BY CHARLES LESTER LEONARD, A. M., M. D., OF PHILADELPHIA.

The value of the Roentgen diagnosis in Pulmonary Tuberculosis has been fully established and a long list of honored Roentgenologists have each added to the value as step by step they have placed it in a position which makes it the most accurate method of determining the extent to which the lung has been involved by this pathologic process.

It is not the purpose of this paper to discuss the comparative values of this method or to attempt to add anything to the technique. The advances in this direction have not been great in recent years, but the knowledge of what can be shown has grown with the experience of close students of the subject. The conservative Roentgenologist has been content with demonstrating what can be shown in the negatives he produces, admitting that the etiologic factor can not be determined by this method, but claiming and proving that its mechanical accuracy and detail offer more exact data upon which to have a progressive and surer means of determining the progress of the disease and the effect of treatment.

The progress in technique has shown that to secure the greatest detail and enable the observer to recognize the most minute microscopic lesions, exposures must be employed that eliminate the motion given to the lungs by the pulsation of the heart. In addition there must remain sufficient density in the normal portions of the lung to ensure a contrast with the foci of disease.

The recognition of quality in negatives is an absolute essential to valuable diagnosis. The production of such negatives is, however, not sufficient to render the diagnosis valuable. The experience of the Roentgenologist in reading these data and his ability to rightly interpret them depends upon the number of cases examined and the care with which they have been studied.

It has been my good fortune to study a recent series of seventy and more cases with a group of internists who are doing systematic scientific clinical work. These cases were all carefully studied and charted, with complete data regarding symptoms, sputum examinations, tuberculin, and other tests, in addition to an accurate mapping out upon charts of the physical signs. The cases were sent in groups of five or six for Roentgen examination, and upon each group an evening was spent in comparing and discussing the data obtained by all methods of examination. The result has been most gratifying. The Roentgenologist has learned much in regard to interpretation, while the clinicians have been convinced of the value of this method as an aid to the accurate diagnosis of Pulmonary Tuberculosis. They say it is the best method of "jacking up" their physical diagnosis and of corroborating and amplifying it that they have found.

They admit that this method is of great value in the early stages of tubercular disease, because it adds definite evidence of pathologic change to a clinical picture which lacked confirmation by physical signs. Also that these added data often confirm an early diagnosis which could not have been made without it, though holding that this method of itself could not form the basis for a diagnosis.

It is with the purpose of pointing out the nature of the additions and confirmations which this method has produced in this series of cases that I bring this subject before you. They present probably nothing new to those conversant with the study of tuberculosis by this method, but they are the evidence which has convinced a group of careful clinical students that this method is essential to every complete clinical examination of a case of pulmonary tuberculosis as seen in the Roentgenogram.

Lesions deeply situated within the thorax have been repeatedly shown when they had escaped percussion and auscultation, while the symptoms pointed to a tubercular lesion.

Thus infiltrated and even calcified peri-bronchial glands have been shown before the tubercle bacillus had been found in the sputum. In many cases where physical signs were absent and the bacillus present, with symptoms pointing to the disease,

the picture has shown enlarged bronchial glands or deep-seated peri-bronchial infiltration. Increased density in the apices of the lungs has often confirmed a physical diagnosis of impaired resonance and altered breathing, while a dullness on percussion which seems superficial was shown to be due to a deep-seated infiltration or commencing consolidation.

The study of evident areas of consolidation, softening and cavitation determines more accurately their situation and extent, while not unfrequently deeply situated areas of consolidation and cavities have been shown that had escaped detection by other methods.

As has been said, the Roentgen rays take cognizance of the increase or decrease in relative density. Thus a marked contrast to the normal is shown between consolidation and compensatory emphysema, the latter being more readily penetrated than the normal lung.

A dilated bronchus can be shown for a similar reason, as in a recent case in which an area at the base of the right lung and in the median line posteriorly was supposed to be a localized empyema, but proved to be dilated bronchi that had been filled with muco-purulent fluid.

The increase in density produced by a thickened pleura can not be differentiated from an equal area of infiltration except by a stereo-roentgenogram. The results of a pleurisy, as localized empyema or pyo and hydro-pneumo-thorax, can be distinctly shown. In one case a superficial area of pneumo-thorax overlay a consolidated and collapsed tubercular lung confusing the physical signs until its presence was detected by the negative. In another case a true hydro-pneumo-thorax of tubercular origin was demonstrated, while in many instances the effect of old pleuritic adhesions was plainly visible in alterations in the curve of the diaphragm.

The relative height of the diaphragm upon the two sides is in a measure an index of the relative capacity of the two lungs, but it is not a constant sign as many other conditions within the thorax vary the relative capacity of the lungs without altering the level of the diaphragm.

Besides the alterations in the lungs and pleura produced by tuberculosis, the Roentgen rays will recognize pericardial effusions and thickenings of tubercular origin.

The relations of the heart and larger blood vessels are often greatly altered by the changes in the lungs. The extent of these alterations has been clearly shown by this method of examination. Not only is the heart drawn over to the affected side by the contracting lung, assisted by the compensatory emphysema, but its axis is also often so altered as to place it in an antero-posterior position. The great blood vessels and other medistinal viscera are also displaced often so far that they lie entirely on the affected side beyond the median line.

Another pathologic change frequently noted in the seventy odd cases recently studied is a calcification of the costo-sternal cartilages. While this may occur from other causes its frequency in tubercular cases is worthy of note.

The re-examination of tubercular cases and the accurate comparison which can be made with former examinations is a feature of great value, as it affords an accurate method of determining the progress of the disease and the efficiency of treatment.

It is thus shown that the Roentgen method of examination is of great value in adding to the knowledge obtained by other methods of physical diagnosis. This is particularly true of the earlier tubercular lesions, especially the deep-seated peribronchial infiltrations and bronchial adenitis. In more advanced cases it adds an element of greater accuracy and detail in localizing the affected areas and corroborates the physical signs, while in all it forms a mechanical method of registering the observations which can be compared with others at a later date.

DISCUSSION.

DR. P. M. HICKEY, DETROIT.

Dr. Leonard's paper gives us additional confirmation of the utility and usefulness of the Roentgen ray in the diagnosis of diseases of the chest. I was glad that the Doctor was rather conservative in the conclusions which he drew and that he did

not consider that all the plates we make are absolutely pathognomonic of the different lesions of the chest. I think that here is a point where we allow our enthusiasm to lead us somewhat astray and that sometimes we draw conclusions which are not always justified. These remarks are intended to apply particularly to the shadows which we find at the root of the lung. Of course we get well-defined areas in other parts of the lung from which we can draw definite conclusions. If we have a definite density around the roots of the lungs, which is produced by chronic inflammation around the bronchi, and not by any increase in the size of the bronchial glands, we can determine the condition present quite definitely, but where we simply have an indefinite shading on each side, and then presume to call it a bronchial gland tuberculosis, we are treading on dangerous ground.

During the past two months I was examining two patients and I ventured to base a diagnosis on the presence of such shadows. Subsequently I employed the tuberculin test, and it was negative. Therefore, I feel that I must be very careful about interpreting these shadows and we should never base a diagnosis of tuberculosis on their presence alone. When we get a well-defined difference in density, we can take greater liberties than when the differences are slight.

DR. ALFRED L. GRAY, RICHMOND, VA.

I would like to ask Dr. Leonard whether he has any explanation to offer concerning the calcification of the costal cartilages in these cases. We undoubtedly have all noticed this calcification, particularly in the costal cartilages of the first and second ribs, and various explanations have been offered, but none have proven satisfactory.

DR. LEWIS GREGORY COLE, NEW YORK CITY.

I am delighted to know that Dr. Leonard has carried on this series of experiments in radiography of the chest in association with clinicians. That is the position we all ought to take. The amount of work we do, diagnostic work, in tuber-

culosis of the chest or in any other condition will prove useful and valuable in proportion as we work with the clinician. We should aim to interest the very best clinicians in this work and go over every case with them as Dr. Leonard has done. Since the last meeting of this Society, I have been doing the same thing with the men in New York, and fortunately I have been able to get men interested who are considered as being head and shoulders above the average diagnostician. Of one of these men Trudeau said that he had the keenest ear of anyone he knew. That man and I carried on a careful series of experiments in these cases. He would make the physical examination, write his diagnosis on a piece of paper, and seal it in an envelope. I made the radiographs, often making a series of them in order to get the greatest detail possible, and then I wrote my diagnosis on a piece of paper and sealed it in an envelope. Then we examined the plates together and compared our diagnoses.

We arrived at the conclusion that the Roentgen ray showed in every case presenting physical signs well-marked tubercular lesions, and in about one case out of four, on an average, he would be unable to detect the least change, whereas the Roentgen ray showed a most characteristic picture. Strange to say, the cases where he failed to corroborate the Roentgen ray findings by physical findings happened to be cases in which the infiltration was most advanced.

Why was that? It was for this reason: The physical signs may be divided into two distinct groups; first, those which are caused by the tubercular inflammation itself. These signs are increased fremitus, dullness, changes in voice and breath sounds, and they are caused by the tubercular deposit—the change in the structure of the lung. They are the signs of tubercular infiltration. The second group are the physical signs which accompany a localized bronchitis, such as a dry or moist râle. That localized bronchitis may or may not be accompanied by tubercular infiltration, at least it may or may not be detected even on the most careful physical examination. In a certain number of cases the tubercular infiltration had advanced to a marked degree before this accompanying bron-

chitis could be detected by physical signs. This divides these cases into two distinct classes of tubercular infiltration, one class in which a bronchitis accompanies the infiltration, and the other in which it does not.

In regard to the point referred to by Dr. Hickey, the lesions showing around the root of the lung, whether we should call those tubercular or not, that is of very great importance. If we see a shadow in a kidney plate, no matter how distinct it may be, we do not say offhand that it is a calculus in the kidney or ureter or elsewhere. Most of us are able to differentiate between the so-called phleboliths and ureteral calculi, and there are many shadows which are distinct and which we do not say are caused by stones in the kidney or ureter. Why therefore, should we, when we find shadows around the root of the lung, throw up our hands and say that we do not take any stock in such things because we find them in cases that are not tubercular? That is true, but there is a difference between the shadows that are and those that are not caused by tuberculosis. The shadows that are caused by tuberculosis present a mottled appearance which is very distinctive, and yet even when such shadows are seen in the plate, it is not right that we should ask the patient to seek another climate but merely tell him that he has tubercular infiltration, which requires certain treatment. Remember, this shadow may be caused by an old infiltration. Bear in mind, however, that if it has the stamp of mottled infiltration which is so characteristic of tuberculosis, whether it is around the root of the lung or in the apex, it is quite likely to be tuberculosis.

DR. KENNON DUNHAM, CINCINNATI.

It is a great advantage to be able to listen to papers that have for their basis work done by the roentgenologist in association with the clinician. The Roentgen examination of the chest is the most important part of our work. It places in the hands of the clinician a very valuable means of diagnosis which is a vital matter to the patient.

In discussing the subject of the diagnosis of diseases of the chest, it is necessary to approach it just as we do any other similar subject. First, you look your patient over, you get his family and personal history, you get your data together, make a careful physical examination, and then a radiographic examination, which brings you to the point of making a differential diagnosis. You eliminate and confirm and to aid you still further, there is at your disposal a tuberculin test. So that the Roentgen ray is of equal value in the diagnosis of these conditions, as are the tuberculin test and the physical examination. One is necessary to the other; neither of them alone is sufficient.

The bronchial glands are enlarged in almost every child that has a cold or adenoids, or some inflammation of the middle ear, and as the glands of the neck are involved, so are the mediastinal glands. It is a simple matter to look at one of these plates and feel that you are dealing with a case of tuberculosis. It simply brings us back to the point where we must admit that we stand greatly in need of a method which will enable us to distinguish between glands that are the seat of tuberculosis, and glands that are not. I hope that Dr. Hickey's plan of using a stereoscopic picture in trying to bring out the thickened vessels and bronchi from the inflammatory tissue surrounding the hilum of the lungs will prove to be what we are after. At any rate, stereoscopy will help us to make a better diagnosis.

Nothing can be of more interest or of more value than the work that is being done in these cases of disease of the chest, but to make a positive statement that this or that thing is wrong simply because we believe it to be so, will do a great deal of harm, and lead to the loss of confidence in our work on the part of the general practitioner. If we can get the general practitioner to cooperate with us, we may be able to solve the problem. They are interested to the same extent that we are. Everyone who is desirous of learning will be able to get much information from the skiagraph of the chest.

Take, for instance, the differential diagnosis of tuberculosis and the chest involvement in grip. The physical signs are almost similar, and yet the skiagraph of a case of influenza fails to reveal any infiltration in the chest; whereas, if that were a tubercular case, showing as many physical signs as it does, the picture would show a process which apparently is of two or three weeks' duration, but which has probably been going on for months and months.

DR. ARTHUR HOLDING, ALBANY, NEW YORK.

This agitation of the tuberculosis question has been productive of much good and has stimulated the Roentgen ray worker to help on the good work. In Albany we have a tuberculosis hospital. We have succeeded in locating many incipient cases of tuberculosis and by doing the radiographic work gratis, I have been able to get the clinicians to listen to me. We have to do this work in exactly the same fashion as we study pathology. When I was a student in the pathological laboratory, the professor in charge would often say that he did not want anyone to make a diagnosis because that was of the least importance. What he wanted us to do was to examine the tissue and describe the conditions present; then if we could base a diagnosis on these findings, well and good but if we did not, it would not detract from the value of our work. So in making these radiographs, the essential thing is to be able to discover and interpret what is shown. I examine the chest fluoroscopically and in safety by means of the machine devised by Holzknecht, and I think that those of you who have been in my laboratory will agree that it is perfectly safe. In fact, if we expect to see Williams' sign, we must use the fluoroscope.

In the interpretation of a negative there are four points. The first is the difference in shading between the two sides of the chest. The second is the detail at the hilum of the lung. The third, areas of infiltration in the parenchyma, and the fourth point is the difference in the doming of the diaphragm.

I note these points on the report and describe fully what I find. I do not always make a diagnosis, leaving that after the consideration of the results of the physical examination, the history, and of the outcome of the tuberculin test.

MR. H. W. DACHTLER, TOLEDO, OHIO.

I would like to ask Dr. Leonard whether he can differentiate skiagraphically between a tubercular and a syphilitic lung.

DR. GEORGE C. JOHNSTON, PITTSBURG.

Very frequently I am confused by shadows around the hilus of the lung which lead me to suspect a glandular tuberculosis In these cases I temporize and insist that the patient take a little iodide of potassium for a month. Then I take another skiagraph and sometimes I find a remarkable diminution in the condition seen previously, and I insist that the iodide be continued.

Another point I wish to mention is that when you are unable to make a diagnosis of a case of tuberculosis of the lung, but you see a few suspicious shadows and you are certain that the patient is not syphilitic, a few small doses of potassium iodide, about three grains, three times daily, with an examination made on the second day afterward, will convince you beyond a doubt of the existence of a tuberculosis on account of the localized congestion brought about by the iodide of potash Any existing localized bronchitis is usually beautifully accentuated by the iodide and the radiograph will show it up very well. We do not see very many cases of syphilis of the lung in this latitude, but if some of our Southern friends would examine the negro population, which is especially prone to this disease, I am sure they would find many cases of syphilis of the lung. It is impossible to differentiate skiagraphically between the two conditions, syphilis and tuberculosis, so that reliance must be placed on the therapeutic findings.

DR. DUNHAM.

A tuberculin reaction is productive of the same result as iodide of potash. Of course, the iodide is better and easier to give. The tuberculin will accentuate the lesions in a chronic case, both on the plate and on physical examination.

DR. LEONARD (CLOSING THE DISCUSSION).

I would like to say that in the study of these cases I have not attempted in any wise to make a diagnosis of tuberculosis and it was not for the purpose of making a differential diagnosis that I brought out this question. Every case I saw had the physical signs carefully mapped out by a competent clinician after I had made my examination, and I simply made a comparison as to how far the Roentgen ray substantiated the findings of clinical methods. In every case in which I made a diagnosis of tuberculosis, the tubercle bacillus was found in the sputum either before or after my examination. After I had proved the presence of the lesion, they frequently found the bacillus when it had eluded their examinations previously.

My cases were all cases of tuberculosis. I have not made any study of syphilis of the lung, nor have I attempted to differentiate between tuberculosis and other conditions. I simply studied tuberculosis.

The calcification of the costal cartilages is something I cannot explain, nor do I believe that anyone else can. Professor Krause, of Jena, spoke to me about this, and out of seventy or more cases that I have seen, seventy-five per cent. showed this calcification in the cartilage of the first rib, but I have seen the same thing in others, even in floating ribs. I do not know what it means.

I do not believe that Dr. Dunham mentioned all the methods of examination which are valuable in the study of tuberculosis. One of the best, one which I hope to have the pleasure of availing myself of in the work I am doing, is the post-mortem examination. I think you will find then the involvement of the glands around the bronchi and in the mediastinum not only in tuberculosis, but in other conditions. The cases I cited

were brought to me as tubercular cases, or with symptoms indicative of tuberculosis, or they were found to be tuberculosis afterwards. I do not pretend to make a diagnosis of tuberculosis from a radiogram; I merely try to show the changes that are taking place in the lungs and glands, but what that change means the clinician and not I must determine.

A PORTABLE PLATE EXHIBIT RACK.

A. L. GRAY, M. D., RICHMOND, VA.

Mr. President and Gentlemen of the Society.

The necessity for a portable plate exhibit rack is familiar to all of us who show our plates at meetings of medical societies, and for convenience I have devised the apparatus which I now present.

To emphasize its portableness, I will say I have brought this from Richmond in the Pullman and on a ferry, carrying it as you see strapped in a bundle, with this shawl strap.

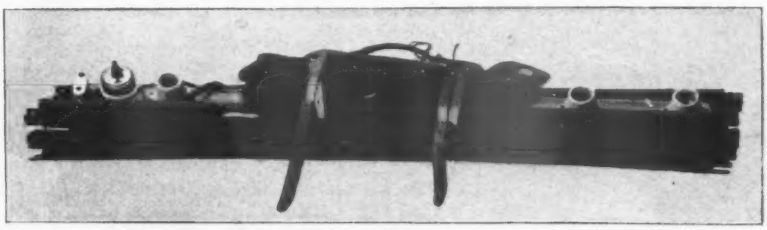
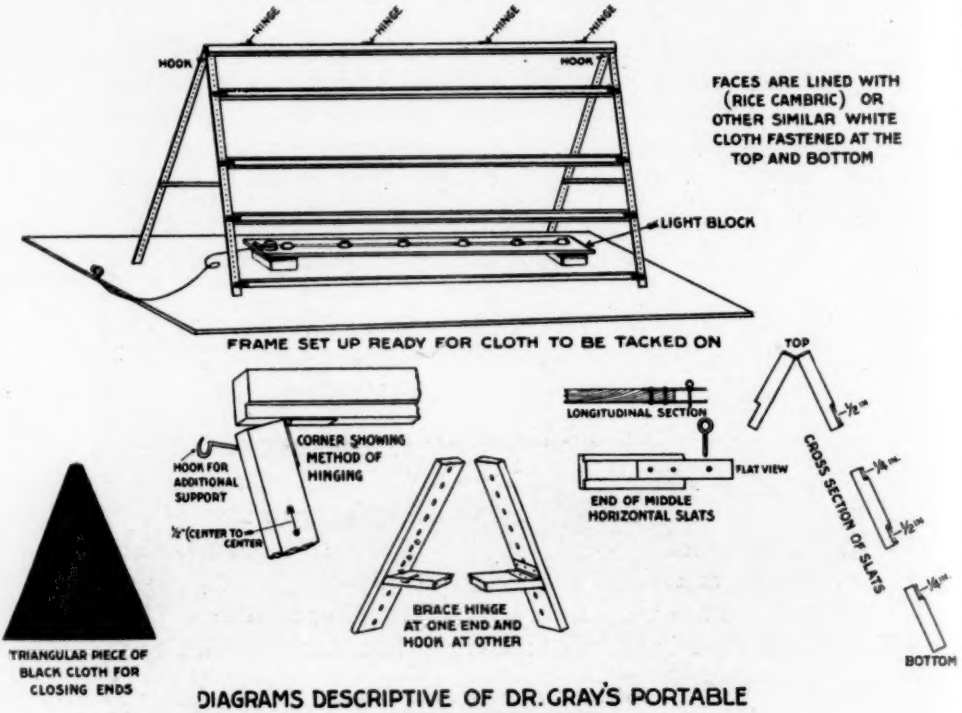


Exhibit Rack Folded and Packed

A great advantage of this cabinet is that it may be made to accommodate any of the usual sizes of negatives from 4 x 5 in. up. The number of plates depends, of course, upon their size. It may be made as long as desired, but its height should perhaps be not over 3 ft., as it would be difficult to light up properly one of greater height.

As you see, the essential frame consists of six slats, the uprights being hinged to the horizontals so that they may be folded on them. The side slats are retained in position by means of slotted ends, which are perforated to admit pins. The uprights have holes drilled in them for the pins, the distance between the centers of two adjacent holes being exactly one-half inch. If the first hole be made at the proper distance from the top horizontal slat, the spaces, when the slats are adjusted, will be found to fit the plates, whatever be their size, and retain them without their falling through. The frame is braced by


HINGE
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FACES ARE LINED WITH (RICE CAMBRIC) OR OTHER SIMILAR WHITE CLOTH FASTENED AT THE TOP AND BOTTOM
LIGHT BLOCK
FRAME SET UP READY FOR CLOTH TO BE TACKED ON
CORNER SHOWING METHOD OF HINGING
HOOK FOR ADDITIONAL SUPPORT
½" (CENTER TO CENTER
LONGITUDINAL SECTION
FLAT VIEW
END OF MIDDLE HORIZONTAL SLATS
TOP
CROSS SECTION OF SLATS
BOTTOM
BRACE HINGE AT ONE END AND HOOK AT OTHER
TRIANGULAR PIECE OF BLACK CLOTH FOR CLOSING ENDS

DIAGRAMS DESCRIPTIVE OF DR. GRAY'S PORTABLE PLATE EXHIBIT RACK
1909

horizontal slats and the legs are made stable by a horizontal brace, which is hinged at one end to one leg and hooked by the other end to the opposite leg.

The rack is lighted by means of a board, provided with as many light-sockets for incandescent lamps as may be desired, and I think it is well to have on this board a snap-switch. A cord of convenient length with a slip-socket attachment is provided for connecting with the light-bracket.

The sides of the rack are lined with some suitable white material, such as "rice cambric," or other similar fabric, and this is fastened by means of thumb-tacks. The lining should be stretched tightly at the top and at the bottom, but allowed to sag somewhat in the center, so as to prevent the texture of the cloth from being visible through the negative.

The ends of the cabinet are closed by fastening in the same

way to the legs, some opaque black material, which has been cut into the shape of an isosceles triangle.

It may be preferred to cover the slats with a thin strip of wood so as to convert into a groove what is seen here to be a rabbet so that the plates cannot be displaced. I have no trouble, however, with the slats as you see them.

This rack, though it appears slender, has accommodated from thirty to forty plates without the slightest show of unsteadiness. The plates and braces seem to make it remarkably strong.

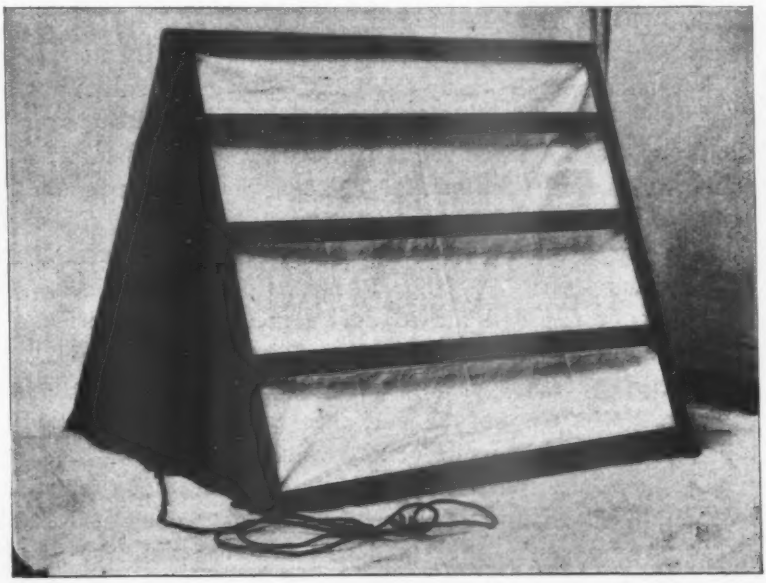


Plate Exhibit Rack of Dr. Gray

I usually carry an additional length of portable cord, so that if the current be not conveniently located, I can obtain electricity in the room best suited for the exhibition, though the light-bracket be in a distant part of the building.

The cost of this device will not exceed $6.00 or $8.00, and it can be made by almost any carpenter.

The cuts give the details of its construction.

312 E. Franklin St.

PRELIMINARY REPORT ON POST OPERATIVE ROENTGEN IRRADIATION FOLLOWING THE RADICAL OPERATION FOR CARCINOMA OF THE UTERUS.

H. W. DACHTLER, TOLEDO, O.
Roentgenologist to St. Vincents and Toledo Hospital.

My attention was first called to this work by Dr. J. H. Jacobson, of Toledo, Ohio, in the summer of 1907. He was then so firmly convinced of the value of the method in carcinoma of the breast that he wished to make use of it in connection with the radical abdominal operation for carcinoma of the uterus.

The method employed by Dr. Jacobson is essentially Wertheim's operation with Bumm's modification for quickly locating the ureters in which the vaginal vault is left wide open for the subsequent X-ray treatment. The operation is made under spinal anesthesia to insure complete muscular relaxation and accessibility to the site of operation. Under spinal anesthesia danger from shock is greatly lessened.

Dr. Jacobson asked me to devise methods and perfect a technique that would allow as near direct treatment of the gland bearing areas it was desirous of reaching as was possible and suggested the use of the knee chest position for the patient.

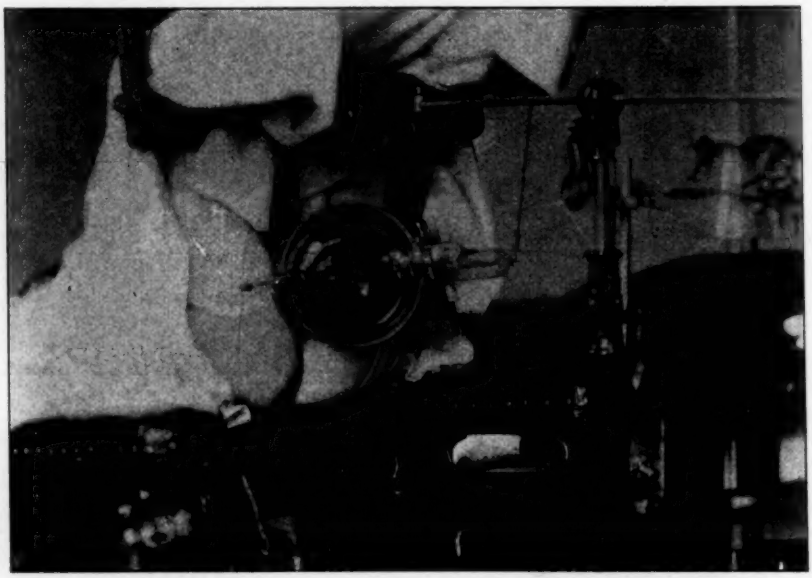
For the treatment to be of any value it was seen that the general principles must follow closely those used in adequate, successful breast work. This necessitated discarding all forms of cavity tubes and using standard tubes that could be carefully tested as to the amount of radiation given off under standard normal conditions of current supply and resistance of tube. My standard conditions conform rather closely to Pancoast's definition of a tube suitable for his method of treating leukemia.

As it was desirous of getting a large cone of rays the use of a speculum of as great a diameter as was possible and of short length was indicated. In addition a tube of small diameter—not over 6 inches—placed close to the speculum helped materially to enlarge the cone. The French tubes of 140 mm

diameter suitable for use with the Sabourand pastules answer admirably for this work.

At this time a patient was available that was suited for this treatment and it was immediately started. In place of a table a couch was used as it was found that it was much easier for the patient to assume and maintain the knee chest position for a sufficient length of time. Corsets must be removed and the chest lowered as far as possible. This allows ballooning of the vagina and the viscera to gravitate from the pelvis. A Ferguson speculum 1½ inches in diameter and 3 inches long was used. This was passed through a hole in the center of a sheet of protecting material 18 inches square which was fastened by tapes passed around the patient's body. The tube could then be placed in contact with the bell mouth of the speculum which served to center the tube to it. The coil terminals, preferably carried from overhead, were easily adjusted and out of the way. This method had one draw-back—the difficulty of adjusting the speculum at angles to reach as much of the parimetrium as possible. This was overcome in later cases by using

a special tube shield to which a speculum could be attached so firmly that it could be adjusted to quite an angle from the normal direction of the vagina. A small plug of cotton in the speculum prevented any secretion from reaching the Roentgen tube. This shield was so arranged that a leather filter such as used by Pfahler could be inserted between tube and speculum. The knee chest position, at first difficult to maintain, soon becomes endurable.



If treatment is begun soon after operation the patient is best placed on her back with the knees elevated and the legs supported by a strap or rest. An ordinary office chair can be used and the head lowered as much as possible in an exaggerated lithotomy position. The tube and shield are supported in an ordinary tube stand, with the axis of the tube in a horizontal plane. This brings it well out of the way of the feet of the patient.

By observing proper antiseptic measures treatment can be begun in this position on the second day and continued daily while the patient is in the hospital. The lead glass speculi are

easily sterilized and are connected to the tube shield after insertion and the danger of infection eliminated.

In the early treatment it seems advisable to use speculi of different lengths and give both deep and superficial irradiations. This is especially indicated in advanced cases of carcinoma of the cervix and may help to prevent recurrence in the vesical and rectal walls.

At the present time it is difficult to obtain the consent of patients for an early radical operation. The cases treated have all been unfavorable from this standpoint. Notwithstanding this the results have been very encouraging.

A special metal speculum so devised that it can be spread cone-shaped after insertion would aid materially in facilitating the treatment. Several models I have devised have not been satisfactory. As recurrence after the radical operation is slow much time must elapse before conclusions can be drawn. It seems reasonable to expect that this treatment should be as efficient in this location as it is in breast cases.

Mrs. M.———, Age 42, Dressmaker, a patient of Dr. B. C. Slocum, of Toledo, Ohio, who was brought for examination on August 15, 1907, gives the following history:

The patient's father died at the age of 56, from "stomach trouble" associated with great emaciation, mother alive at 80 and well; she has had three children, all living, ages 21-19-17; her labors were all difficult.

Began menstruating at the age of 12, menstruates about every three weeks, profusely, without pain.

Patient states that about two years ago had severe attack of "nervous prostration."

The present illness dates from last December (1906), beginning with a continued profuse bloody discharge. This has continued almost daily up to the present time; of late there has been a foul odor to the discharge. Has been growing weaker for past two months. Patient's usual weight is 127 lbs., there has been no material loss in weight.

Upon examination, there is marked pallor and anemia. A blood examination was not made.

Examination of the heart, lungs, liver, spleen, and abdomen gave negative findings.

Vaginal examination showed an enlarged, nodular, irregular, bleeding cervix, the irregularity apparently limited to the vaginal portion of the cervix. A piece of the cervix was excised and given to Dr. R. P. Daniells for microscopic diagnosis. Dr. Daniells found the disease to be squamous-celled carcinoma of the vaginal portion of the cervix uteri.

The radical abdominal operation after the method of Wertheim was made at St. Vincents Hospital on September 12, 1907, under ether anesthesia. The disease was found to have extended into and infiltrated the right broad ligament, there were no palpably enlarged glands in the pelvis. On account of the infiltration of the right broad ligament the operation was difficult, tedious, and accompanied by severe hemorrhage, the right ureter was freed with difficulty. After the uterus, tubes, ovaries and part of the vagina were removed, some of the infiltrated parametrium still remained. On account of the prolonged operation and hemorrhage, the patient suffered a severe collapse on the table, which necessitated the rapid completion of the operation, with vigorous stimulation. The wound in the pelvis was packed, two clamps attached to blood vessels on right side of pelvis were left in situ, and the abdomen closed and the patient put to bed. The foot of the bed was elevated, continuous saline solutions given by hypermoclysis and per rectum. Patient recovered from her collapse during the first twenty-four hours, the pulse coming down to about 100. The clamps and gauze packing were removed on the second day, and convalesence was somewhat retarded by the appearance of a phlebitis in the right leg, accompanied by persistent swelling.

The X-ray treatment was begun one month after operation and continued uninterruptedly for three months at intervals of two and three days.

The patient gained rapidly in strength and appearance immediately after the operation.

As a small piece of infiltrated parametric tissue (about 1 inch

long and ½ inch wide) was left at the time of operation, the subsequent course of the patient was watched very closely.

On or about March 1, 1908, patient complained of some pain in the right side of pelvis, accompanied by some bloody discharge. A small persistent sinus in the vaginal vault was discovered and an infiltrated area in the right side of pelvis could be felt. It was then thought best to remove this infiltration by way of the vagina, for it seemed to be a recurrence of the disease.

On March 3, 1908, with the ureter catheters in situ, an attempt was made to remove the infiltrated area at St. Vincents Hospital. This, however, could not be accomplished, for the mass was very hard, dense, fibrous, and firmly attached to the side of the pelvis, so as to render its removal impossible.

The X-ray treatment was again resumed and vigorously employed; the slight hemorrhage gradually ceased, and the sinus in the vaginal vault closed.

A recent examination of this patient September 14, 1909, two years after the operation, shows the vaginal vault closed perfectly, no induration or infiltrations are palpable in the pelvis, patient feels well, is gaining in weight and works at her occupation of dressmaking daily.

This case is of particular interest, inasmuch as it gave an opportunity of demonstrating the effect of the ray upon a piece of apparently carcinomatous tissue which had been unavoidably left behind at the time of operation.

DISCUSSION.

DR. HENRY K. PANCOAST, PHILADELPHIA.

Whatever can be done to give relief in carcinoma of the uterus is certainly well worth trying. The rather unsatisfactory results which have followed the use of the Roentgen ray in this condition are in the main due to faulty technic, particularly in the selection of a suitable speculum. So far as I know, there is no good speculum for this purpose. I have used them all, including the Ferguson, but they are all worthless

for this work. If any member of the Society knows of a good speculum, I would like to have him tell us about it.

DR. KENNON DUNHAM, CINCINNATI, OHIO.

The greatest credit is due any man who will give time and thought to this work, and if the surgeon will try to persuade his patient to Roentgen radiation a day or two after an operation of this kind, he too will be doing good.

DR. H. W. VAN ALLEN, SPRINGFIELD, MASSACHUSETTS.

I have treated a number of cases of cancer of the uterus, but unfortunately the patients have died. I felt that the speculum was at fault. Of late I have been using a cavity tube of good proportions, and I have had the manufacturers make a speculum of glass. The end of the speculum is covered with glass which is transparent to the X-ray. In that way a large speculum can be introduced without causing too much pain to the patient. We can easily treat the lower part of the vagina because it falls forward, and the upper portion and the cervical stump can be reached with the speculum. Although the patients I treated died, about a dozen, they were more comfortable. Two of them did very well for nearly a year. Then they stopped taking the treatments and promptly died.

DR. P. M. HICKEY, DETROIT.

While I do not see very many treatment cases, I have had the misfortune of having under my care two very late inoperable cases of carcinoma of the uterus. The cases were so advanced that the surgeons who saw the patients absolutely declined to operate. I was asked to try the Roentgen ray, and I did so, but with a great deal of hesitation. I used the ordinary cavity tube, which generates a very feeble ray at the end. I kept the tube as high as possible during the treatment, and gave frequent treatments. In the first case the amelioration of the symptoms for a considerable period of time was quite

striking. The pain and discharge were lessened, and the patient lived for two years, which the surgeon, who first saw the case, thought was very remarkable.

The second patient has gone on in much the same condition. A prominent gynecologist strongly advised against the performance of a radical operation because of the advanced progress of the case. The patient had been taking an anodyne, but under the Roentgen ray treatment the pain practically disappeared and the anodyne was discontinued voluntarily. The patient's general condition was much improved, so that it must be admitted that in these two cases at least the Roentgen ray was productive of most satisfactory results.

DR. GEORGE C. JOHNSTON, PITTSBURG.

My experience in carcinoma of the uterus has been confined to five inoperable cases. Of course, these five patients are now dead, but they did receive considerable relief from the Roentgen ray treatment. The pain was diminished in every case and I succeeded in making these patients comfortable for some months. They were all bad cases, and I am convinced that in each case the practical impossibility of getting a sufficient quantity of radiation over a wide enough area was the factor which contributed mostly to the failure of the treatment.

It seems to me that the ingenuity of the members of this Society ought to enable someone to devise a proper speculum and a cavity tube emitting an appreciable quantity of radiation where it is needed. In my first case I used a so-called cavity tube, where the cathode stream impinges on the end of the prolongation, and is covered over with a test tube filled with water, a water-jacketed tube. The radiation emitted from this tube was practically **nil**, and in succeeding cases the attempt was made to throw the rays directly on the parts to be treated through a suitable speculum made of celluloid, glass and metal, but every such speculum had to be discarded eventually. Now, I have not any speculum which can be used to advantage in these cases, which will allow me to cover as large an area as should be treated, and do the patient any good at all.

In one of my cases I attempted to balloon the vagina by means of a small air bag, but as soon as I got the amount of ballooning that seemed necessary, there was a hemorrhage That discouraged me from making any more attempts along that line. It seems to me that a wool tampon might do some good.

DR. D. R. BOWEN, TROY, NEW YORK.

In one of my cases I made use of a method which, although not successful, has not been mentioned. It was impossible to do a complete operation in that case, although the surgeon at first considered it operable. During the operation he found that he could not remove all the diseased tissue without endangering the life of the patient. I tamponned the vagina with wool, making a tight packing, and passed the rays in through that. The vagina was ballooned out considerably, and there was a great deal of surface for exposure, although the result eventually was no better than in any other case. For nine or ten months, however, the progress of the case was held in abeyance, the patient was able to walk to the office, and was practically free from pain. After that, however, the downward course was a very rapid one.

DR. DACHTLER (closing).

I have had just as much trouble with the specula as Dr Pancoast has had. I devised a metal speculum with short arms, with the projection turned at an acute angle, so that when in place in the vagina there was a greater ballooning effect produced. It is extremely difficult to get a speculum made just right, and the one I now use seems to be the best thing so far. If we are going to get results in this work, we must have a tube that will enable us to do just what we want to do, and then stop. We should not carry these cases over too long a time.

My experience has been that the mucous membrane will stand much larger doses of the ray, about twice as much, as are ordinarily given to the skin of the face; you can govern yourself accordingly. In the first case treated the piece of

tissue was excised. Macroscopically it was a telangiectasis of the mucous membrane; microscopically it showed the formation of an embryonic type of blood vessel. Most of the work previously done along this line was for the purpose of giving the patient relief from pain, but if we expect to produce a cure in these cases, we must get the uterus out of the way first. A radical operation will remove nearly all, if not all, of the carcinomatous tissue. I have had six cases under treatment for a year or more, and all of the patients are well, except two, who have had a recurrence.

It was with the object of destroying the glands and the lymphatics of that region where recurrences ordinarily take place, that this treatment was devised. With the body of the uterus in place, you cannot get enough energy to do the work In one case I treated the vaginal vault was left open, and I inserted the speculum too deeply. A recurrence took place in the bladder wall, which remained localized for nine months.

ADDRESS BY THE PRESIDENT

DR. GEO. C. JOHNSTON, PITTSBURG, PA.

The presidency of the American Roentgen Ray Society is the highest honor that can be attained by any Roentgenologist. The duties of the office are manifold and the delivery of an address at the annual meeting is the most onerous. Such an address should cover the entire field of Roentgenology and call attention to the advances of the year in every direction; and such an address is beyond the powers of your unworthy president. I shall therefore devote the time allotted to me to a consideration of a few matters that have to do with the welfare and progress of the Society and its members.

The Roentgenologist is usually a beloved crank. Few of them have any business sense, and the calling is so fascinating that they tear themselves with difficulty from the worship of the tube to sit down and loaf and invite the soul. Considerations of finance, policy, and protection are neglected for the more inspiring study of technic and interesting readings of each new hidden mystery in the negative.

Already medicine and surgery are indebted to the pioneer Roentgenologists far beyond their powers of repayment. The Roentgen Ray is today, in the hands of the expert, the greatest diagnostic agent possessed by medicine. Is the Roentgen worker receiving his just share of the emoluments of the profession? I think not.

First, you will admit that the dangers of this branch of medicine braved by the operator have not been exaggerated. The insurance companies are beginning to look upon us as undesirable risks. There is no need to rehearse here the actual peril which is about every man who spends much time in a Roentgen laboratory. In other walks of life positions of danger are highly paid in proportion to the danger and the skill required to perform the work. There is no branch of surgery requiring higher skill or more exacting technic than that necessary for success in Roentgenology, and in addition

there is no work in either which is so dangerous to the operator. Obviously, then, the Roentgenologist should be the highest paid man in the profession, but he is not.

Again, no professional man is required to make such expenditures for equipment or to maintain such a large and constantly accumulating scrap pile as we are. The apparatus of today is obsolete tomorrow. There is a constant race between our pocketbooks and the inventive genius of the up-to-date manufacturer.

And last, and most painful of all, the work is appreciated by about one physician in three hundred and fifty.

Just the other day I received a reprint from a prominent surgeon, who stated in all gravity that he had decided that the Roentgen Ray was a diagnostic agent in calculus ureteritis.

On the brighter side, however, are those up to the minute surgeons and physicians who instead of gravely coming in to look at a plate and holding it upside down, want diagnoses, and accept them at par value.

Since we are denied many of the things which go to pay in part for professional endeavor, we should look a little more to our own interests. The average Roentgenologist does not charge enough for his services. The public appreciate a thing by the price tag. The low standard of fees set by the general profession is to blame for much of this. The general practitioner sees the Roentgenologist charge fifteen or twenty-five dollars for an examination, when he is accustomed to spending a night at a labor case for ten dollars, and he demurs. He fails to see that every man who pays a good fee to a specialist, appreciates all the more the value of medical services.

The education of the profession and the public to expect diagnoses instead of pictures from the Roentgenologist is progressing slowly. The sooner we cease making prints from our negatives, the quicker will this education be complete.

The keynote of success in our work is careful, exact procedure. One incorrect diagnosis made from the study of plates not up to the standard, will more than offset a year of good work in the minds of an operator's clientele.

Radioscopy is coming into vogue rapidly, and much good and much worthless work is being done in this important line. Many of the men who have taken up the screen with a rush, will lay it down with a sigh. Protection of the most exacting kind is here necessary, yet seldom employed. It seems that the sad warnings with which we are so familiar, have been sounded in vain. The fallacy that a ray from a tube excited by a static machine is harmless, is still alive, in spite of the deaths from carcinoma of the two chief supporters of this grievous error.

The American Roentgen Ray Society is in good condition, but we are not increasing in size as rapidly as would seem proper from the great increase in the number of Roentgenologists in this country. This may be well, but the Society is showing a constant deficit, and either the membership roll or the dues must be increased.

There is no journal devoted to Roentgenology published in this country, and this should be a constant reproach to the members of the Society. I would suggest the appointment of a committee to take up a proposition to publish a journal devoted to this subject; the Society agreeing to furnish the material, and the election of an editorial committee to supervise the journal.

The publication of the Transactions should be undertaken immediately following the meeting, and they should be in the hands of the Society within three months. This is almost impossible, and cannot be done if proof is sent to each member and cuts are made, unless each paper is in the hands of the Secretary at the close of the meeting.

The time and place of meeting should be decided upon before the close of each meeting.

A committee on scientific program should be appointed by the president, which committee should outline a program and obtain papers on a wide scope to cover the entire subject of Roentgenology. This work should be done early in the year, so that each man should have plenty of time to prepare his paper.

A manufacturers' association, composed of the makers of apparatus, should be formed, which association should have an open meeting at the annual session, where new apparatus could be demonstrated and explained before the entire Society. Each year new devices are shown in our exhibit, the significance of which is lost to many of us from lack of such complete demonstration and exhibition.

One of the best ways of keeping up to date in our work is to see how the masters of the art work; hence I would suggest that an annual pilgrimage be inaugurated. Thus, if the Society were to meet in Detroit, Drs. Hulst, Crane, and others in that vicinity should arrange to be at home to the members on certain days before the meeting, and have everything in their laboratories ready to show. These pilgrimages would prove most instructive to those able to attend.

The discussion is always the most valuable part of the meeting, and as we have plenty of time for all the papers, I trust that it will be full and complete. There are many of our members who never take the floor unless specially listed, or only when called upon by the chair. Often subjects are under discussion where the experiences of the most humble of us may be worth more than the theory of the most prominent, therefore do not hesitate to join in the discussion of any subject where your experience may prove helpful and enlightening.

Your president wishes to thank you for the high honor conferred upon him, and we will now proceed with great interest to the scientific program.

AMERICAN ROENTGEN RAY SOCIETY.

Minutes of the Tenth Annual Meeting, held in Atlantic City, N. J., Sept. 23-25, 1909.

FIRST DAY—MORNING SESSION.

The Society convened in Haddon Hall, and was called to order by the President, Dr. George C. Johnston, of Pittsburg, Pa., at 10 o'clock.

The Secretary, Dr. Percy Brown, of Boston, read the minutes of the previous meeting, which, on motion, were approved as read.

In furtherance of the action taken by the Society, at the Cincinnati meeting, in 1907, Dr. F. H. Baetjer moved the suspension of the publication of the Transactions and the publication of an official journal, to be issued quarterly or otherwise, as the Publication Committee would decide. This motion was seconded by Dr. Pancoast and was carried unanimously.

Dr. Pancoast then asked permission to withdraw his motion to table the matter of raising the dues made at the previous meeting (New York, 1908), and was permitted to do so. Dr. Kennon Dunham then moved that the annual dues of the Society be raised to **ten dollars.** Seconded and carried.

The Secretary then read his annual report, which, on motion of Dr. Baetjer, was accepted.

SECRETARY'S REPORT.

It occurs to the Secretary that his report may properly be divided into the question of Society membership, and a few remarks about the annual Transactions. He is pleased to note that, although not many applications have been made for membership, the majority of those received have come apparently from men who were more than passingly interested in the status of the Roentgen Rays today. In many instances, these applications have come from men who have already done some

work with the rays, both experimentally and clinically. This experience enables them at once to become more useful members to the Society than they would be if they had but a rudimentary smattering of the principles of the art. Two of the applications, the Secretary notes, come from gentlemen resident in the Dominion of Canada. This is well, as it will extend our influence beyond the northern border of our country into a region where a great deal of the most excellent medicine is being practised. It also carries our influence into that portion of the continent where there is said to occur a certain type of endemic disease,—to wit, the occurrence of urinary calculus in the Maritime Provinces. The Secretary believes that the study of urinary calculus with the Roentgen Rays is yet in its infancy, and much good work, therefore, should be accomplished by our new members, who are fortunately situated where this affection is apparently endemic. From the character of the communications received by him, especially certain epistles from foreign parts the Secretary believes that the serious energies put forward by our members to uplift and maintain the character of American Roentgenology is being appreciated and respected abroad. This respect and appreciation comes from foreign scientists, many of whom themselves are in the extreme skillful as Roentgenologists; therefore, if straws show which way the wind blows, their attitude toward us is all the more flattering.

THE TRANSACTIONS FOR 1908.—The Secretary, who was this year appointed editor of the Transactions, has already, without intending to make undue excuses, attempted to explain certain of the causes of its late appearance. He appreciates as well as anyone how annoying this late appearance must be to those who so generously took part in last year's meeting, and especially so to our former President, whose efforts did so much to make the meeting in New York such a success. He wishes to add, however, that in addition to the unavoidable handicaps met with, which were outlined to you in a short circular, he has been encumbered by his inexperience in editing a similar volume heretofore. In the light of this experience, of which he now is the well-seasoned possessor, he would respectfully ask

that in future members who wish the Transactions to appear as soon as is possible, would make it a point to be models of punctuality in returning copy of corrected discussions. As an acute example of what these little delays mean, he would mention, in passing, the fact that a certain member's corrected discussion was finally received from him in the month of July, 1909, for publication in the Transactions of the Society for 1908. As about this time the printing presses were running merrily, the delay on the part of this member caused his tardy discussion to suffer the punishment it deserved.

The first portion of this report is, then, proudly, the latter portion, penitently, and the whole, respectfully submitted.

PERCY BROWN,
Secretary.

The Treasurer, Dr. Charles F. Bowen, read his report, which, on motion of Dr. Pancoast, was accepted.

TREASURER'S REPORT.

Report of the Treasurer from Dec. 28, 1908, to Sept. 23, 1909.

Dec. 28, 1908, balance on hand	$ 384.05
Membership dues	635.00
Exhibitors,—New York Meeting	594.00
Total	$1613.05

Expended

F. C. Zapffe	$ 50.00
Geo. C. Johnston	25.00
L. C. Cole	46.20
Tehrune Catering Co	75.00
The Astor Press	3.75
P. M. Hickey	40.50
J. W. Lieb	232.07
F. C. Zapffe	100.00
Marion White, (Sten.)	74.25
R. H. Sayre	77.50
J. W. Travell	25.00

Nitske Bros. Printing	6.00
Terry Eng. Co.	12.55
E. L. Auld Co.	59.65
C. F. Bowen, (expenses for two years)	171.36
Total	$998.83
Total collected	$1613.05
Total expended	998.83
Balance on hand	$ 614.22

CHAS. F. BOWEN,
Treasurer.

On motion of Dr. P. M. Hickey, seconded by Dr. Dunham, a rising vote of thanks was tendered the Treasurer for his very efficient services.

Dr. E. H. Skinner moved the appointment of a committee of three to draft a scheme for the publication of the quarterly journal, said committee to report on the morning of the second day. The motion was carried.

The Chair appointed on this committee Drs. E. H. Skinner; F. H. Baetjer and P. M. Hickey.

There being no further business to come before the Society at this time, the scientific program was proceeded with, and Dr. Sidney Lange, of Cincinnati, Ohio, read the first paper entitled "X-Ray Examination of the Mastoid Process."

The paper was discussed by Drs. E. W. Caldwell, Charles F. Bowen, Willis F. Manges, George E. Pfahler, George C. Johnston, and in closing by Dr. Lange.

Dr. Percy Brown, of Boston, read a paper on "The Relation between Bodily Deformity and Gastro-Intestinal Irregularities: A Roentgenologic Study."

The paper was discussed by Drs. George E. Pfahler, Charles M. Hazen, and Dr. Brown.

Dr. Baetjer, Chairman of the Executive Committee, reported that a number of applications had been received, acted on by

the Committee, and turned over to the Secretary. The Secretary read the following applications, on which favorable action was taken by the Executive Committee:

Howard E. Ashbury, M. D., Baltimore, Md.
Alex. P. Bergman, M. D., New Haven, Conn.
L. Gordon Brown, M. D., Colorado Springs, Colo.
Albertus Cotton, M. D., Baltimore, Md.
Edw. S. Hatch, M. D., New Orleans, La.
Edward Herbert, M. D., Fall River, Mass.
Edw. Leaming, M. D., New York, N. Y.
R. O. Meisenbach, M. D., Buffalo, N. Y.
Wm. H. Mick, M. D., Omaha, Neb.
C. M. Peabody, D. D. S., So. Orange, N. J.
Chas. J. Search, M. D., Brooklyn, N. Y.
W. H. Stewart, M. D., New York, N. Y.
Edw. C. Titus, M. D., New York, N. Y.
Robert Wilson, M. D., Montreal, Que.
Fred. C. Zapffe, M. D., Chicago, Ill.

On motion of Dr. Dunham, the Secretary was instructed to cast the ballot of the Society for the election to membership of the above-named applicants, which he did.

The Society then adjourned until 2 P. M.

AFTERNOON SESSION.

The Society reconvened and was called to order by the President at 2 o'clock.

Dr. George E. Pfahler, of Philadelphia, contributed some notes on "The Roentgen Laboratories of Europe."

The paper was discussed by Drs. H. W. Van Allen, Arthur Holding, W. H. Dieffenbach, D. R. Bowen, Charles Lester Leonard, and in closing by the author.

Dr. H. K. Pancoast, of Philadelphia, followed with a paper on "X-Ray Diagnosis of Achondroplasia and Cretinism," which was discussed by Drs. Chas. Lester Leonard, P. M. Hickey, J. W. Hunter, L. G. Cole, and in closing by Dr. Pancoast.

Dr. P. M. Hickey, of Detroit, contributed a paper on "Stereographic Radiography of the Chest."

The discussion on this paper was opened by Dr. E. H. Skinner, and continued by Drs. C. L. Leonard, H. K. Pancoast, E. W. Caldwell, and closed by Dr. Hickey.

Dr. Charles Lester Leonard, of Philadelphia, read a paper on "The Roentgen Diagnosis of Pulmonary Lesions."

The paper was discussed by Drs. P. M. Hickey, A. L. Gray, L. G. Cole, Kennon Dunham, Arthur Holding, H. W. Dachtler, George C. Johnston, and closed by Dr. Leonard.

The Chair here appointed the following Auditing Committee: Drs. Stewart, Lawrence, and Vail.

The Society then adjourned until Friday, at 10 A. M.

SECOND DAY—MORNING SESSION.

The Society reassembled at 10 A. M., and was called to order by the President, Dr. Johnston.

The President announced that the time and place of the next meeting were now open for discussion. Dr. Hickey extended an invitation to meet in Detroit, and Dr. Gray invited the Society to meet in Richmond, Virginia. These invitations were referred to the Executive Committee for action.

Dr. W. H. Dieffenbach asked for permission to speak on the question of personal privilege, which was granted. He protested against the curtailment of the paper which he presented to the Society at the last annual meeting, and which was published in the Transactions in very abbreviated form. He claimed that much valuable material had been omitted, and that the paper in the form as published was incomplete.

The Secretary stated on his behalf that, owing to the length of the paper and the fact that a considerable part of its contents was general and did not have any special reference to Roentgenography, the paper was submitted to the Board of Censors. The President of the Board directed that only such portions of the paper as dealt with the use of the Roentgen Ray should be published, which was done.

Dr. Pfahler then moved that in the future all changes deemed necessary in an original article to permit of its publication be submitted to the author for approval. The motion was seconded by Dr. Dieffenbach and carried.

The Chair here appointed the Nominating Committee, consisting of Drs. Van Allen, Holding, and E. H. Skinner.

Dr. E. H. Skinner, Chairman of the Special Committee on Publication of a Journal, presented a report, which, on motion of Dr. Hunter, was adopted.

REPORT OF COMMITTEE ON QUARTERLY.

Your Committee on the Quarterly has considered at length the various phases of the manner of publication of the official organ of this society and would commend to your attention the following suggestions:

1. That the publication be known as "The American Quarterly of Roentgenology," the official organ of the American Roentgen Ray Society.

2. That it be published on the first of December, March, June and September, the dates being selected so as to place the completed program in the hands of the members on the first of September, prior to the annual meeting.

3. That the membership fee be split into two portions; $5.00 to be applied to the running expenses of the Society and $5.00 to the Quarterly fund as the members' subscription to the Quarterly, this latter proviso being necessary to accord with the present postal laws. The subscription price to non-members shall be $5.00 per annum.

4. That the Publication Committee appoint the Editor-in-Chief, the said Publication Committee to be nominated by the Nominating Committee at the annual meeting in conjunction with the other officers, and the power of the Publication Committee over the Editor to cease with his appointment, except in an advisory capacity. That the Treasurer of the Society be the Business Manager of the Quarterly.

5 That the American Roentgen Ray Society do now incorporate as a body in order that the Editor-in-Chief be relieved of the embarrassment of any financial emergency, such as printing contracts, etc.

6. That contributions be received from non-members of the Roentgen Ray Society.

7. That special discounts be granted to manufacturers who will both advertise and take space in the exhibit at the annual meeting.

8. That provision be made for the expenses of the editorial officers for stenography, mailing, etc.

9. The last suggestion that the Quarterly Committee would respectfully bring to your attention, while not legitimately within its province, is logically the outcome of the previous suggestions; namely, that the By-Laws be so amended or revised that the preceding suggestions may be incorporated in the Constitution of the Society.

Respectfully submitted,

P. M. HICKEY,
F. H. BAETJER,
E. H. SKINNER.

Dr. W. H. Dieffenbach, of New York, contributed a paper on "Differential Diagnosis of Disease of Bone by the Roentgen Method."

The paper was discussed by Drs. Percy Brown, F. H. Baetjer, H. K. Pancoast, George E. Pfahler, L. G. Cole, Kennon Dunham, Charles Lester Leonard, Hammond, George C. Johnston, W. S. Lawrence, Charles M. Hazen, and in closing by the author.

The Chair here appointed the following committee on Revision of the Constitution and By-Laws, the committee to report before final adjournment: Drs. P. M. Hickey, F. H. Baetjer, and E. H. Skinner.

Dr. A. J. Gray, of Richmond, Va., read a paper on "Technic in Calculus Diagnosis," and demonstrated a portable plate exhibit rack.

On motion, the discussion on this paper was deferred until the afternoon session.

The Auditing Committee reported that the books of the Treasurer had been duly audited and found to be correct. On motion of Dr. Pfahler, the report was accepted and the committee discharged.

The Society then adjourned until 2 o'clock.

AFTERNOON SESSION.

The Society reassembled at 2 o'clock, and was called to order by the President.

The postponed discussion on Dr. Gray's paper was opened by Dr. Charles Lester Leonard, continued by Drs. L. G. Cole, M. K. Kassabian, George C. Johnston, Sidney Lange, Percy Brown, and closed by the essayist.

Dr. L. G. Cole, of New York, then read a paper on "Speed Mania in Radiography."

The paper was discussed by Drs. P. M. Hickey, George E. Pfahler, E. W. Caldwell, V. J. Willey, M. K. Kassabian, D. R. Bowen, Percy Brown, Charles Lester Leonard, George C. Johnston, and Dr. Cole.

On motion, Dr. P. M. Hickey read a paper on "X-Ray Work in Hospitals," prepared by Dr. Rollin H. Stevens, of Detroit, who was unable to be present.

Dr. C. M. Peabody, of South Orange, N. J., contributed a paper on "Some Experiments and Conclusions in the Exact Measurement of the X-Ray."

This paper was discussed by Drs. E. W. Caldwell, George E. Pfahler, H. W. Dachtler, H. C. Snook, and by the essayist in closing.

On motion, the Society adjourned until 8 P. M.

EVENING SESSION.

The Society reassembled at 8 o'clock, and was called to order by the President.

Dr. D. R. Bowen, of Rome, N. Y., contributed a paper entitled "A Few Laboratory Helps."

The paper was not discussed.

Dr. M. K. Kassabian, of Philadelphia, considered "Roentgen Ray Dermatitis; Its Prevention and Treatment."

This paper was discussed by Drs. F. H. Baetjer, D. R. Bowen, W. S. Lawrence, Cotton, Geo. C. Johnston, and in closing by Dr. Kassabian.

On motion, Dr. Carl Beck's paper, entitled "The Roentgen Treatment of Basedow's Disease and its Results," was read by title and ordered published.

The Society then adjourned until Saturday morning at 10 o'clock.

THIRD DAY—MORNING SESSION.

The Society reassembled and was called to order by the President at 10 o'clock.

The Executive Committee reported that Detroit had been selected as the next place of meeting, the time for such meeting to be decided on by the Committee later.

On motion, this report was accepted.

The Nominating Committee reported as follows:

President—George E. Pfahler, of Philadelphia.

Vice-Presidents—Vernon J. Willey, of Rochester, Minn.; C. E. Coon, of Syracuse, N. Y.; Russell D. Carman, of St. Louis; and Roland Hammond, of Providence, R. I.

Secretary—Percy Brown, of Boston.

Treasurer—Charles F. Bowen, of Columbus, Ohio.

Executive Committee—P. M. Hickey, of Detroit.

Publication Committee—F. H. Baetjer, of Baltimore; E. W. Caldwell, of New York, and Sidney Lange, of Cincinnati.

On motion, this report was accepted, and the Secretary instructed to cast the ballot of the Society for the election to office of those named in the report, which he did.

On motion of Dr. Hickey, the Board of Censors was authorized to remove from the roll of membership the name of T. M. Woodhouse, of Toronto, Canada, if the Board found that the charges preferred against him were correct.

The Board also called attention to the fact that certain manufacturers who have been represented in the exhibit at the annual meetings of the Society are engaged in diagnostic radiographic work. The Board recommended that these manufacturers be informed that the Society does not approve of such

a procedure, and that no invitation be extended to them to exhibit at any meeting of the Society until this matter has been adjusted satisfactorily.

On motion of Dr. Dunham, the Secretary was instructed to transmit to these manufacturers the action of the Society in regard to this matter.

Dr. Pancoast moved that the necessary steps be taken looking toward the incorporation of the Society.

On motion of Dr. Skinner, Dr. Pancoast's motion was tabled.

Dr. Arthur Holding and Dr. Kennon Dunham each contributed a paper on the "Treatment of Tubercular Cervical Adenitis with the X-Rays."

The discussion on these papers was opened by Dr. E. H. Skinner, and continued by Drs. Charles Lester Leonard, J. W. Hunter, H. W. Dachtler, D. R. Bowen, Geo. C. Johnston, and closed by Drs. Holding and Dunham.

Dr. H. W. Dachtler, of Toledo, Ohio, contributed a paper entitled "Roentgen Treatment following the Radical Operation for Cancer of the Uterus."

The paper was discussed by Drs. H. K. Pancoast, Kennon Dunham, H. W. Van Allen, P. M. Hickey, George C. Johnston, D. R. Bowen, and in closing by the essayist.

The Publication Committee announced the selection of Dr. P. M. Hickey, of Detroit, Michigan, as Editor of the official journal. On motion, this report was accepted.

There being no further business to come before the Society, the motion was carried extending a vote of thanks to the management of Haddon Hall for courtesies shown to the Society during its meeting.

The Society then adjourned.

GEORGE C. JOHNSTON, President.
PERCY BROWN, Secretary.

EDITORIAL.

Owing to the very serious illness of Dr. Hickey the editorials that should have appeared in this number are omitted.

Following is the announcement of the committee on arrangements for the 1910 meeting. The early announcement of the time and place of this meeting will allow ample opportunity for all who desire to attend to plan accordingly.

Arrangements for the 1910 Meeting.

The committee on arrangements met at the Hotel Cadillac, December 6, and decided this hotel offered the best advantages for our 1910 meeting. In fact the committee is quite enthusiastic over the accommodations which suit our requirements so well. The meetings, manufacturers' exhibit and plate exhibit can all be held under one roof with ample room for all.

First of all the Cadillac Hotel is first class in its appointments, service and cuisine. It is comfortable and home-like, and the management will do everything in its power to make its part in the meeting a success.

The meeting room is on the second floor away from the noise of the street. It has a high skylight and several windows next the alley, thus affording good ventilation. The skylight will be darkened for us when we wish to use the lantern. It will seat 400 people.

Adjoining this room and connected with it by a door is the Flemish Room—an L-shaped room 35 feet by 18 feet at one end, and 12 feet at the other end. This is admirably suited for a **Plate Exhibit room.** Additional room for this purpose may be had if needed in a short hall at one end of the room.

On the ground floor adjoining the lobby is the large Turkish Room, connected with the lobby by three large sliding doors. This room is oblong, 55 feet by 27 feet. It will be used for the Manufacturers' Exhibit. It could scarcely be

better situated, and will afford ample space. If we need more, however, we may have a part of the lobby adjoining, used as a writing room.

The committee decided to encourage the plate exhibit in every way possible. Mr. Dachtler has charge of it. The committee will be able to exhibit plates of any size and number from lantern slides to the 14x17 size. The exhibition of lantern slide reductions will be made a feature of this meeting. The committee will also encourage the exhibition of prints from interesting plates.

The manufacturers are promised all the current they want. A plant in the building supplies direct current at 118 volts and plenty of it. The Edison Co. have a station adjoining the hotel and can supply more if we need it. They will have all the space they require, and they can go away at night and during sessions and leave everything safe behind lock and key. The committee desires to receive suggestions from the manufacturers, and will endeavor to please them in every way possible.

September 29th, 30th and October 1st have been selected for the meeting. This will allow members attending to return home before the opening of the college year.

Plan now for the 1910 meeting.

R. H. STEVENS,
Chairman.

The first of a series of X-ray plates covering the gastro-intestinal tract. Patient had just swallowed about 20 fluid ounces of bismuth mixture. Exposure about 3 seconds during suspended respiration, patient standing. The white shadow shows the bismuth mixture which fills the dependent portion of the stomach and the pyloris. The dark area above the level of the bismuth is due to gas inflating the cardiac portion of the stomach (the "magen-blase"). A portion of the stomach wall appears as a light line enclosing this light area. It will be seen that the greater curvature extends well below the level of the crests of the ilia.—E. W. Caldwell, M. D.

ABSTRACTS.

A BRIEF REVIEW OF THE APPLICATIONS OF THE ROENTGEN RAYS IN DIAGNOSES.

BY E. W. CALDWELL, M. D., NEW YORK CITY.

(Abstracted from a paper read before the New York State Society.)

Although brilliant radiographs of wrists, hands, elbows and teeth may be made by almost any amateur, the successful use of the X-ray for diagnosis in the thicker parts of the body and especially in the urinary tract, the gastro-intestinal tract, the thorax and the nasal sinuses has been attained by comparatively few men who have spared neither pains nor expense in perfecting their technique. The very great difference in the cost of making an X-ray examination of a simple subject like a wrist or hand and of a difficult one like the gastro-intestinal tract, is seldom appreciated. One of my colleagues tells me that his outlay for tubes and plates in such an examination as the one last mentioned averages at least $25.00 for each case.

The Roentgenologist of to-day practices one of the most difficult, dangerous and unremunerative of medical specialties, but the stigma of the bell-hanger's X-ray picture shop still clings to him. Strangely enough, although there are few if any legal restrictions, the practice of the art by those without medical training has almost died out except in some of the hospitals in our largest and least progressive American cities.

The almost ineradicable impression that the radiograph is a picture or a photograph which any one may properly examine, interpret and criticize, has been a great hindrance to the progress of Roentgenology and to its proper recognition.

The radiograph is in fact not a picture or even a photograph, except in the sense that photographic materials are used in its production. It is a special kind of projection and is essentially more like a slide for the microscope than a photographic view. Unfortunately it may so much resemble a photograph that laymen and medical men alike are apt to regard it as a view and not suspect how incomplete and even how dangerous their over-confident interpretations of it may be.

The mere operation of an X-ray outfit is becoming much easier with improved appliances, but the number and the cost of the necessary appliances have increased enormously. In the present state of the art expensive tubes must be sacrificed in order to obtain the best radiographic work in difficult cases. The cost of replacing these tubes amounts in some good laboratories to more than fifteen hundred dollars per year, and this with the cost of new appliances that must be added from time to time to replace those which become obsolete, are important items in the maintenance expenses of an up-to-date equipment. Such expenditures as these may, of course, be avoided if one is content with mediocre results, or if he does not undertake the difficult cases.

The Roentgenologist who would excel must provide himself with the best possible equipment; he must acquire skill in the technique of using it; he must be painstaking in his observation of the plates, accurate and not over-enthusiastic in his interpretation of them. His opinion should be valued rather than his so-called X-ray pictures.

The somewhat spectacular features of Roentgen diagnosis have attracted to it a few prolific writers whose accounts of miraculous results are not worthy of confidence, but there are in the field many earnest scientific men who are devoting their lives to making Roentgenology more and more useful to the healing art, and who deserve the respect and co-operation of their colleagues in medicine and surgery.

Interlobar abscess. The light shadow in upper right side of plate was produced by pus between upper and middle lobes of right lung, and walled off by adhesions. An accurate diagnosis had been made from the symptoms and physical signs alone. This diagnosis was confirmed by the X-ray and later by operation and autopsy.—E. W. Caldwell, M. D.

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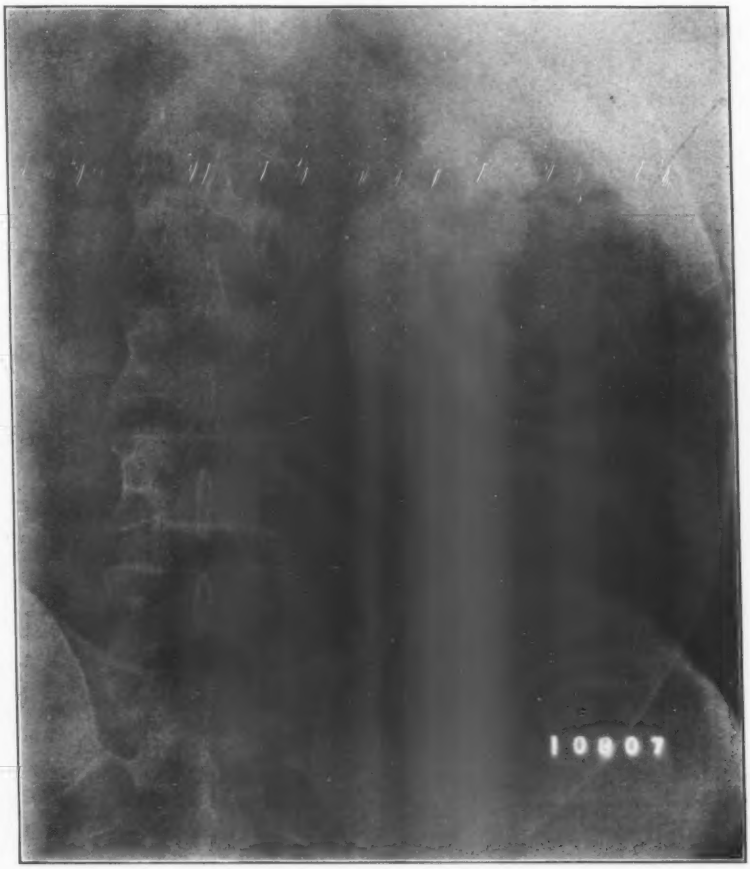

Pyelo-nephritis with dilatation of upper portion of ureter. A 20 per cent. solution of Argyrol was introduced into kidney pelvis through ureteral catheter. The silver solution is relatively opaque to X-rays and therefore produces the light shadows to the right of spine, outlining the dilated ureter and some of the calices of kidney.—E. W. Caldwell, M. D.

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IMPROVED APPARATUS FOR LOCALIZING FOREIGN BODIES IN THE EYE-BALL BY THE ROENTGEN RAYS.

BY WILLIAM M. SWEET, M. D., PHILADELPHIA, PA.

(Abstracted from American Ophthalmological Society Transactions, 1909.)

In the new apparatus the planes of shadow of the foreign body are accurately determined by the instrument without the necessity on the part of the operator of taking measurements from the plates or in drawing lines on the chart. The tube-holder, indicating ball, and plate-holder are upon a movable stage, and therefore preserve a known relation to each other, which does not vary. The angle of the rays with the eyeball and the distance of the tube from the plate are always the same, so that one indicator is sufficient, and this consists of a small steel ball supported in a ring of transparent celluloid. The setting of this ball opposite the center of the cornea is made by means of adjusting screws conveniently placed on the frame of

Fig. 3.—Image of cross-wire and cornea.

the instrument. Accuracy in the measurement of the distance of the indicating ball from the center of the cornea is secured by means of a telescope and reflecting mirror. The mirror gives an image of a cross-wire and a lateral image of the cornea. Through the telescope the observer adjusts the instrument until the image of the cross-wire is in direct contact with the image of the summit of the cornea. (Fig. 3.) When the adjustment is made, the indicating ball is exactly 10 mm. from the center of the cornea. A miniature incandescent lamp, mounted in an adjustable shade, illuminates the side of the nose of the patient, insuring a well-lighted image of the cornea and cross-wire.

Instead of a ball of cotton or other object for fixation, as in the older method, a circular mirror is placed at a distance of 12 inches above the injured eye. The patient gazes in the mirror and sees a reflected image of the injured eye and the circular celluloid disc with the steel indicating ball in its center. After the ball has been adjusted to a point opposite the center of the cornea of the injured eye, the patient by fixing the ball with the seeing eye prevents any movement of the eye during the exposures and holds the visual line of the injured eye parallel with the plate.

In order to shorten the time of making the radiographs and lessen the possibility of any movement of the patient or apparatus in changing plates, the two exposures in the new apparatus are made upon one plate, metallic shutters protecting those portions of the plate which are not to be exposed to the rays.

The tube-holder contains the usual cylindrical lead-glass shield for protecting the operator from the action of the rays, with the customary lead diaphragm. The central orifice of the diaphragm is covered with aluminum, which offers little obstruction to the rays, but lessens the risk of any unfavorable action of the rays upon the patient and guards against possible damage to the eyes in the event of breakage of the tube. The tube-holder slides upon a graduated rod, and the first exposure is made with the indicator at zero, in which position the rays pass in a direction corresponding with the horizontal plane of the eyeball. The second exposure is made with the tube at its farthest point to the right or left of the first position, depending upon which eye is to be examined. The illustration (Fig. 1) gives a view of the complete apparatus.

Since the relative position of the tube in reference to the indicating ball and the photographic plate remains fixed and known, it is readily seen that the direction of the X-rays in passing through the eyeball must follow a definite course, which is always the same for the two separate exposures. It is, therefore, possible to indicate on the localization chart the direction of the rays at the two exposures, and this has been done in the chart, a copy of which is reproduced in Fig. 4, re-

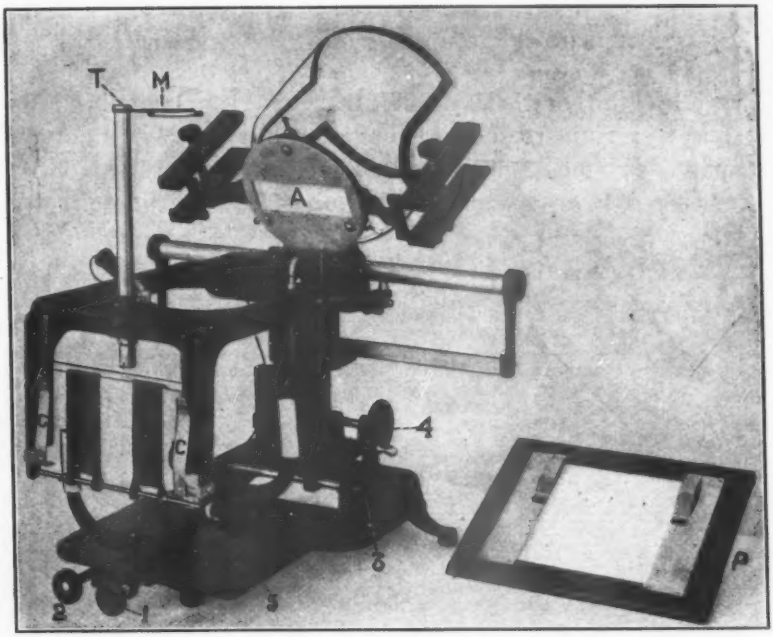

Fig. 1.

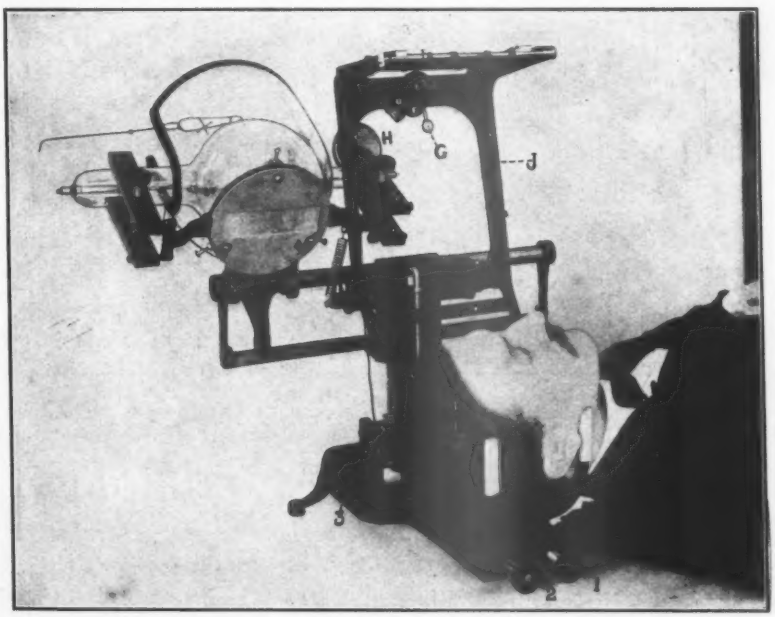

Fig. 2.

duced in size one-half. Only those lines representing rays 2 mm. apart are reproduced, but each line is drawn with the required amount of divergence to indicate the rays as coming from a point the distance of the tube from the photographic plate.

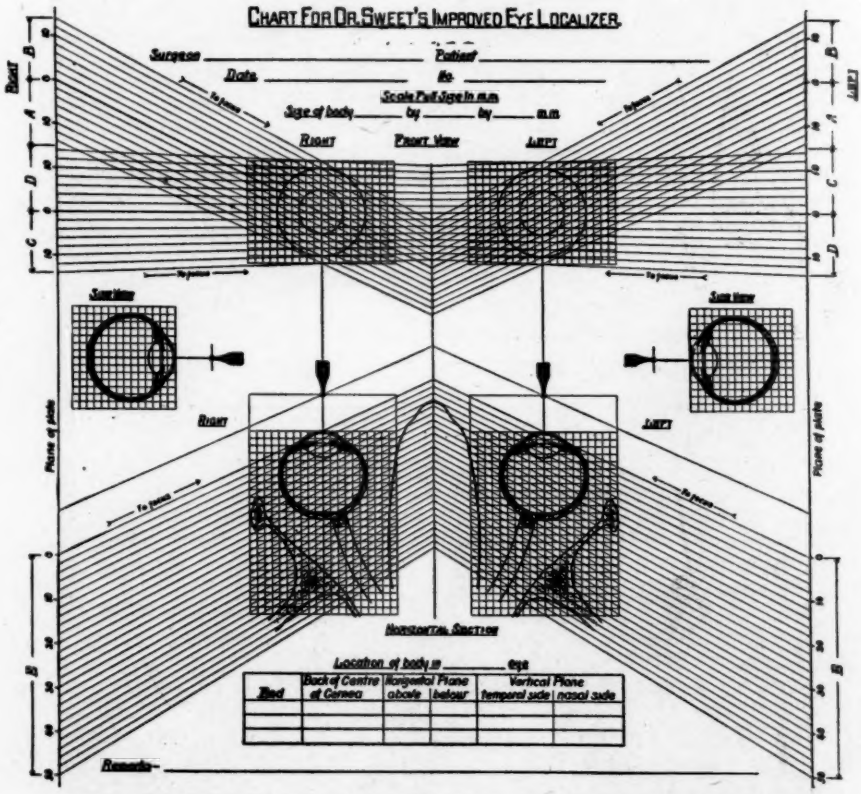

Fig. 4.—Localization chart, with lines representing course of the x-rays (one-half actual size).

METHOD OF EMPLOYING THE NEW LOCALIZER.—The apparatus is arranged as shown in Fig. 2. The patient lies with the head on a platform of hard fiber, with a pillow beneath the shoulders and a small sand-bag under the head and neck. The upright supports for holding the head are now adjusted by

means of the wheel 1, and the jointed part of the apparatus, J, containing the indicator is brought down in position. The indicating ball, G, is now roughly adjusted until it is opposite the center of the cornea and about 12 or 15 mm. distant. The patient looks with the uninjured eye into the mirror, M, and fixes upon the iris or cornea of the injured eye, or, better, upon the indicating ball in the center of the celluloid disc. The indicating ball is now carefully adjusted directly over the corneal center by means of the wheels 2 and 3, and the correctness of the position verified by observation through an opening in the mirror, M. The operator then adjusts the light of the small electric lamp so that the side of the nose next the injured eye is illuminated, but the light is not thrown into the eye. With this area lighted it is possible to see clearly through the telescope, T, when the cross-wire is exactly tangent with the summit of the cornea. The movement necessary to secure this position of the wire is made by means of the adjusting wheel 4. When the image of the cross-wire touches the image of the corneal summit, the indicating ball is exactly 10 mm. from the eyeball.

The photographic plate is inserted beneath the spring clips, C. C., the shutters S S moved so that the center area is open (Fig. 1), and the tube-holder adjusted to the zero point on the sliding scale. The current is turned on, and one exposure made. The tube-carriage is then moved to the limit of the sliding rod, always in the direction of the chin of the recumbent patient (to the end marked R if the radiographs are made of the right eye, and to L if of the left eye). The upper shutter is moved to cover the exposed central portion of the plate and uncover the upper unexposed portion. The current is again turned on and the second exposure made. The time of exposure for the second picture should be about one and a half times that of the first, to allow for the increased distance of the tube from the eye.

After the plate is developed it is placed in the frame P. (Fig. 1), containing the key plate or focal coordinates (Fig. 5), with the film side of the radiograph next to the key plate. The radiograph is moved until the shadow of the indicating ball of

the first exposure is in apposition with the middle ball on the key plate and the heavy horizontal line of the radiograph parallel with the horizontal line on the plate. Holding the frame to

Focal Co-ordinates for Dr. Sweet's Improved Eye Localizer

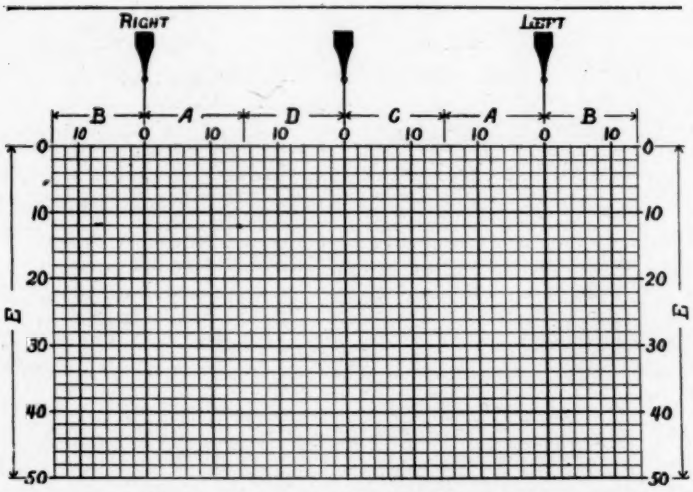

Fig. 5.—Plate showing focal coördinates (three-fourths actual size).

the light, there is noted the position occupied by the shadow of the foreign body with respect to the vertical lines of "C" and "D." A reading is made of the line or lines, which pass through the body, and this is transferred to the corresponding lines of the "C" or "D" scale of the chart, to the right or left side, depending on which eye is under examination. Without removing the plate the "E" reading is similarly made and transferred to the chart. To take the "A" or "B" reading the plate is shifted slightly until the image of the indicating ball on the second exposure coincides with the "Right" or "Left" ball of the vertical coordinates "A" or "B." The line or lines of the "A" or "B" coordinates which cross the shadow of the body are noted and indicated on the "A" or "B" lines of the chart. The

horizontal coordinate "E" should be the same in both readings. If the focus point on the anode of the tube was accurately set by the cross-lines on the lead-glass shield of the tubeholder, the

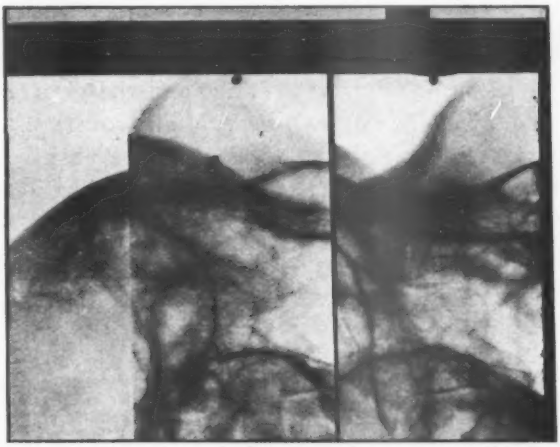

Fig. 6.—Radiograph of foreign body in eye (three-fourths actual size).

images of the indicating ball on the plate will coincide simultaneously with those on the transparent key plate, and it will then not be necessary to reset the plate to read the position of the "A" and "B" coordinates.

After the three readings have been transferred to the chart, the point of crossing of the "A" or "B" and the "C" or "D" lines is found, which gives the location of the foreign body in reference to the front view of the eyeball, indicating its situation above or below the center of the cornea and to the nasal or temporal side of the vertical plane. Where a vertical line from this point crosses the "E" reading on the horizontal section of the globe it gives the depth of the body in the eyeball or orbit. In bodies of large size both ends should be localized to give the position in which the body rests in the globe. The situation of the body on the side view is determined by transferring its measured depth from the horizontal section and its distance above or below the horizontal plane from the front view localization.

The new apparatus is based upon the same general principles as was the old, but its mechanical features eliminate some of the errors that may occur in the use of the present instrument through carelessness of the operator in making the measurements and transferring them to the chart. The inexperienced worker in eye localization is also relieved of the necessity of studying out the position of the tube and the direction of the lines of shadow at the two exposures. The construction of the new apparatus insures that these factors are positively determined and recorded. The accuracy of the localization depends only upon the care with which the operator adjusts the indicating ball opposite the center of the cornea and at the definite and fixed distance from it. After the exposures are made and the plate developed, the determination of the situation of the foreign body is simply a question of reading from a key plate and transcribing these readings to the chart.

Radiographic Search of Foreign Bodies. Etienne Henrard, of Brussels. Annales de Electrolobiologie et de Radiologie, July, 1909.

The author first discusses at length the methods of locating and removing foreign bodies of the respiratory and digestive tracts, and, second, foreign bodies in the other tissues.

The mistakes and difficulties connected with the location and extraction of a needle from the hand must not be attributed to radiography as has been done in recent writings, but rather to a badly made radiograph. The precision with which foreign bodies can now be located should serve to give the surgeon clear and accurate directions to the end that he would no longer pursue a false route in his operation. All foreign bodies should be extracted, because of pain they may cause in the neighborhood or in remote regions, because of injury to nerves, because of loss of power resulting from their presence in muscles, and danger of migration with sometimes fatal results.

The following methods should be abandoned: Taking two radiographs at planes at right angles to each other, because without mathematical calculations one does not arrive at results which give accurate information, extraction of foreign bodies with screen, because of danger from hemorrhage, nerve

injury, infection, and radio-dermatitis, also because radioscopy does not give best results in determining location of foreign body.

What is necessary: Rapid screen examination to determine general location of object, and mark it on the skin with metallic marker, a second rapid screen examination to show that markers are well placed, then make stereoscopic radiographs according to the method of Marie and of Ribout of Toulouse, and finally to employ a geometric process (triangulation) in order to fix the precise spot the surgeon should look for the foreign body. The method is as follows:

Two radiographs are made of the same subject on the same plate at two different angles, the subject remaining in the same position, thus obtaining double shadow of the object. The anticathode is placed at a known distance from the plate, say 415 millimeters, parallel to the plane of the plate, and so that the perpendicular from anticathode to the plate passes through the foreign body. Move the tube 3 centimeters to the left and parallel to the plane of the plate. Make an exposure, then move it the same distance to the right, and make another exposure. There are thus 6 centimeters between the points of emission of the rays in the two exposures. Then after developing our plate we measure the distance between the centers of the two images of the foreign body, and with pencil and paper demonstrate our problem.

Let these two points be known as A and A'. Let C a point below but midway between the above points be the foreign body. Below this draw a dotted line P which represents the plane of the plate. Draw lines from A and A' through the foreign body C to the plane P. Connect the points where these lines intersect P with a straight line aa'. This line represents the distance between the shadows of the foreign body. Thus two triangles are formed with their apex at C, and their bases represented by AA' and aa'. Draw a perpendicular through C from the middle of AA' to the middle of aa'. Let this perpendicular line in the lower triangle be known as x and that in the upper triangle as h. There are then two similar triangles,

the homologous lines of which are proportional, and the following proportion can then be announced: $\frac{x}{h} = \frac{aa'}{AA'}$

But in a proportion the first term is to the sum of the two first as the third is to the sum of the two last, then,

$$\frac{x}{(x+h)} = \frac{aa'}{aa' + AA'} \text{ or } X = \frac{x}{x+h} = \frac{aa'}{aa' + AA'}$$

Replacing these terms by the measures obtained, namely AA'=60 millimeters, aa'=19 millimeters, x+h=445 millimeters, we find that x=107 millimeters. That is, the foreign body is 107 millimeters from the plate. From this other calculations can readily be made.

FORTSCHRITTE AUF DEM GEBIETE DER ROENTGENSTRAHLEN, BAND XIV, HEFT I, AUGUST 30, 1909.

Abstracted by DR. SIDNEY LANGE.

Value of Roentgen Examination of Pulmonary Gangrene, Abscess and Bronchiectasis, by Dr. M. Otten.

The author examined eight cases of gangrene, two cases of abscess, and three cases of bronchiectasis. While the clinical signs of the respective lesion are usually clear, many cases are not definitely recognized without X-ray examination. The chief value of the X-ray in these cases is to make an accurate topographic diagnosis as to the seat of the lesion to guide surgical interference. The X-ray will rarely distinguish abscess from gangrene, but it will differentiate abscess and gangrene on the one hand from bronchiectasis on the other. Abscess and gangrene present hazy infiltration, while bronchiectasis shows dilatations along the bronchial tree.

Contributions to the Roentgen Diagnosis of the Urinary System, by Dr. G. Fedor Haenisch.

I—Pyelography. The difficulty of differentiating renal calculus, tumor and hydronephrosis is so often encountered, that it is desirable in many cases to show the size of the pelvis of the kidney. If the renal pelvis be enlarged beyond the boundaries

of the normal kidney outline, it may be suspected by finding the kidney shadow displaced outward away from the spine and enlarged. But if the pelvis is enlarged "within" the kidney, that is, if the pelvis is enlarged without enlarging the kidney shadow, its recognition by the X-ray becomes impossible.

Voelcker and von Lichtenberg have outlined the pelvis by injecting, through a ureteral catheter, a warm 5 per cent Collargol solution, and then skiagraphing.

Haenisch reports a case in which the symptoms were those of calculus, but upon skiagraphing with the ureteral catheter in situ, the upper end of the catheter (in the renal pelvis) made a wide curve, suggesting a dilated pelvis. Collargol (4 per cent) was then injected, and the skiagraph obtained made the positive diagnosis of hydronephrosis.

II—Sources of Error in the Diagnosis of Calculi.

A case of calcified ovary which resembled a vesical calculus is here reported. The author has held the opinion, that the "pelvis spots" (beckenflecken) so often encountered on the skiagram are phleboliths. During a pelvic operation he found some of these bodies in a venous plexus, and found by microscopic examination that they originated in the lumen of the veins. He discovered similar shadows upon the X-ray plate of an elbow. Since the arm presented many varicose veins, he inferred that the small shadows represented phleboliths.

Another interesting case is reported, in which Blaud's pills gave shadows in the kidney region that resembled calculi.

Gall-Stones Recognized by the X-Ray, by Dr. Edward Gottschalk. Gottschalk reports an unusual case, in which he obtained the shadows of three gall-stones upon the Roentgenogram.

Roentgen Ray Injuries of the Skin, by Dr. Rammstedt.

The author reviews the literature, pathology, and clinical course of X-ray dermatitis. He inclines to the view that idiosyncrasy plays a part in their production.

Thirty-four cases of "Roentgen Carcinoma" (following X-ray dermatitis) are to be found in the literature with a mortality of 24 per cent. Four cases of typical sarcoma have been reported, so that we may also speak of "Roentgen-sarcoma."

Medicinal treatment of X-ray burns has been of no avail. Rammstedt recommends palliative measures until the burn has fully developed. Then it should be excised and the area skin-grafted.

Simultaneous Roentgenography of Both Kidneys by Means of a Double Cathode Tube, by Dr. Franz M. Groedel.

The author shows a device for exposing both kidneys at the same time, by using two parallel cylinders and a "stereo-tube."

Theory of a Method of Giving Heavy Deep X-Ray Treatments Without Injuring the Skin, by Dr. Alban Kohler.

In order to pass heavy X-ray doses deep into the tissues without injuring the skin, it is suggested that a wire screen (or netting) be placed on the skin and a tube having a large focus area be placed but a few centimetres distant. Very heavy exposures may thus be given, which because of the large focus area will (in spite of the wire screen) penetrate the deeper tissues rather uniformly, while the skin, if it is injured at all, will suffer only in the interstices of the wire screen. The burns will thus be punctiform and should heal readily because of the surrounding healthy skin.

Therapeutic Applications of the X-Rays, by Dr. Max Bachem.

A most complete bibliography of the X-ray therapeutic literature of the world, covering 34 pages, is here presented. The lists are classified according to the disease treated, and the end result of the treatment is given in each case.

This compilation should be very valuable for reference.

FORTSCHRITTE AUF DEM GEBIETE DER ROENTGENSTRAHLEN, BAND XIV, HEFT 2, OCTOBER 5, 1909.

Juvenile Epiphyseal Disturbances, by Dr. H. Thiemann.

Under this title four unusual cases are described. The first is that of a boy aged 16 presenting a broadening of the phalangeal joints, with stunted growth of the phalanges of unknown etiology. The roentgenogram showed a spreading out of the margins of epiphyseal cartilages with an irregular thinning at the center. No similar case in the literature.

The second case presents a symmetrical enlargement of both elbow joints which the X-ray shows to be due to diffuse thickening of the bone. Etiology is likewise obscure.

Two cases of multiple exostoses and chondromata which by interfering with the epiphyses resulted in deformed growth are described.

Pathological Calcification and Its Recognition by the X-Ray, by Eug. Fraenkel.

(1) Calcification of the vas deferens is a rather rare occurrence. Routine post-mortems have shown that it does occur however, and not always as a senile change, but may be found as early as 40 years. The change may be unilateral or bilateral. While the cases described were all discovered post-mortem, it is not improbable that extreme calcification of the vas deferens may be recognized during life by the X-ray. Such shadows may be confused with vesical or ureteral calculi.

(2) Under the title of Calcification of the Cerebral Blood-Vessels, the author refers to a rare change in the smaller arteries of the white substance of the brain. The process is not of arterio-sclerotic origin, since the larger vessels are unaffected. The change cannot be recognized during life with the X-rays.

Radiography of Inter-cranial Lesions, by Carl Klieneberger.

In the detection of inter-cranial lesions the X-ray may be used to show changes in the bones of the skull and accumulations of pus in the accessory cavities, or to show changes in the brain itself.

The value of the X-ray in the recognition of disease of the accessory sinuses (mastoids, ethmoids, frontals and antri) and the recognition of gross bone changes such as exostoses, necrosis, new growths as well as atrophy, and erosion from pressure of intercranial tumors and cysts, cannot be questioned. Change in the diploetic canals has been given by Schuller as an indication of an inter-cranial tumor, but the constancy and reliability of this sign is open to question.

The diagnosis of uncalcified cerebral tumors is on very uncertain grounds. The author could find but two well-authenticated cases of non-calcified brain tumors diagnosed by the X-ray in the entire German literature.

More or less calcified tumors offer a better prospect for X-ray detection. A case of calcified tumor of the parietal lobe is reported in full with skiagram.

The Erythema Dose as Measured by the Milliamperemeter, by Prof. Dr. B. Walter.

The author has worked out a series of tables expressing the erythema dose in terms of milliampereminutes. The erythema tint of the Sabouraud pastilles is used as the basis of the standardization of the tables.

The three important factors to be considered in the measurement of the radiations from the tube are:

(1) The velocity of the cathode rays, i. e., the penetration.

(2) The nature of the metal of the target.

(3) The thickness of the glass wall of tube in the central axis of the rays.

To these must be added another factor, i. e., the target-skin distance.

Tables are presented giving the milliampereminutes necessary to produce an erythema for variations in the thickness of the wall of the tube (0.2 to 1.0 mm) for variations in the penetration (Walter 2 to 5) and for different distances (10 to 40 cm.). In a special table the various penetration scales (Walter, Benoist and Wehnelt) are compared.

The milliampereminute tables presuppose the use of a platinum target without a filter, and must be modified according to variations in the metal of the target, and the nature of the filter.

Roentgen Therapy with Short Exposures, by Prof. Dr. Albers-Schönberg.

Schönberg advocates very short therapeutic exposures with a heavy milliamperage. Such short exposures save time and tubes, and are more agreeable to the patient.

In experiments upon guinea pigs, passing 35 milliamperes through the tube with a target-skin-distance of 11½ cm. changes in the testicles were produced in from 36 to 78 seconds.

In the same manner erythema and epilation were produced in patients after an exposure of 15 to 30 seconds (Milliamperage 35, target-skin-distance 13 cm.).

Roentgen Therapy of Deep-lying Tumors, by Dr. H. E. Schmidt.

The author advances a method of treating deep-lying tumors based upon Schwarz's experiments which showed that the capability of reacting to the X-ray depended upon the sensitiveness or susceptibility of the tissue to the ray. This susceptibility varies with the metabolic activity of the tissue. Thus an inflamed or hyperaemic tissue will react more strongly to the ray than will an anaemic or cynosed tissue. He therefore proposes to "desensitize" the skin by pressure-anaemia, and to "sensitize" the deep-lying tumor by using the high-frequency current to produce hyperaemia and increased metabolic activity in that tumor.

Beneficial Influence of the Roentgen Rays upon Menstrual Disturbances, by Dr. Manfred Frankel.

The author summarizes the results of X-ray therapy upon menstruation and menstrual disorders. He has observed 80 cases in which menstruation has been more or less influenced. The early cases were those under treatment for other than pelvic conditions, and in many cases the pelvis received no direct exposure. Nevertheless menstrual changes, such as delayed and scant periods, were noted. This fact speaks for an elective action upon the ovary, or a special susceptibility of the ovary to the X-ray.

Twenty cases of menorrhagia from myomata were favorably influenced with a diminution in the size of the tumor in a large per cent.

Sixty cases of menorrhagia, metrorrhagia, dysmenorrhoea, fluor albus, and endometritis were improved or cured in 5 to 12 treatments.

The first effects are often temporary, and disappear in several months, necessitating a repetition of the treatment. But the ovaries react much quicker to each repetition necessitating fewer treatments.

Time of exposure from 5 to 10 minutes, distance of tube 30 cm., diaphragm 5 cm. in diameter, stanniol filter. Four treatments are given, followed by a 6 days pause. The most favor-

able time for treatment is during the first half of the intermenstrual period and especially after the cessation of the menstrual flow.

The author believes that the uterus is not affected directly but that the changes are brought about through the ovary.

Diverticula of the Oesophagus, by Dr. T. Sjogren.

Two cases of diverticula of the upper part of the oesophagus are reported with skiagrams. S. L.